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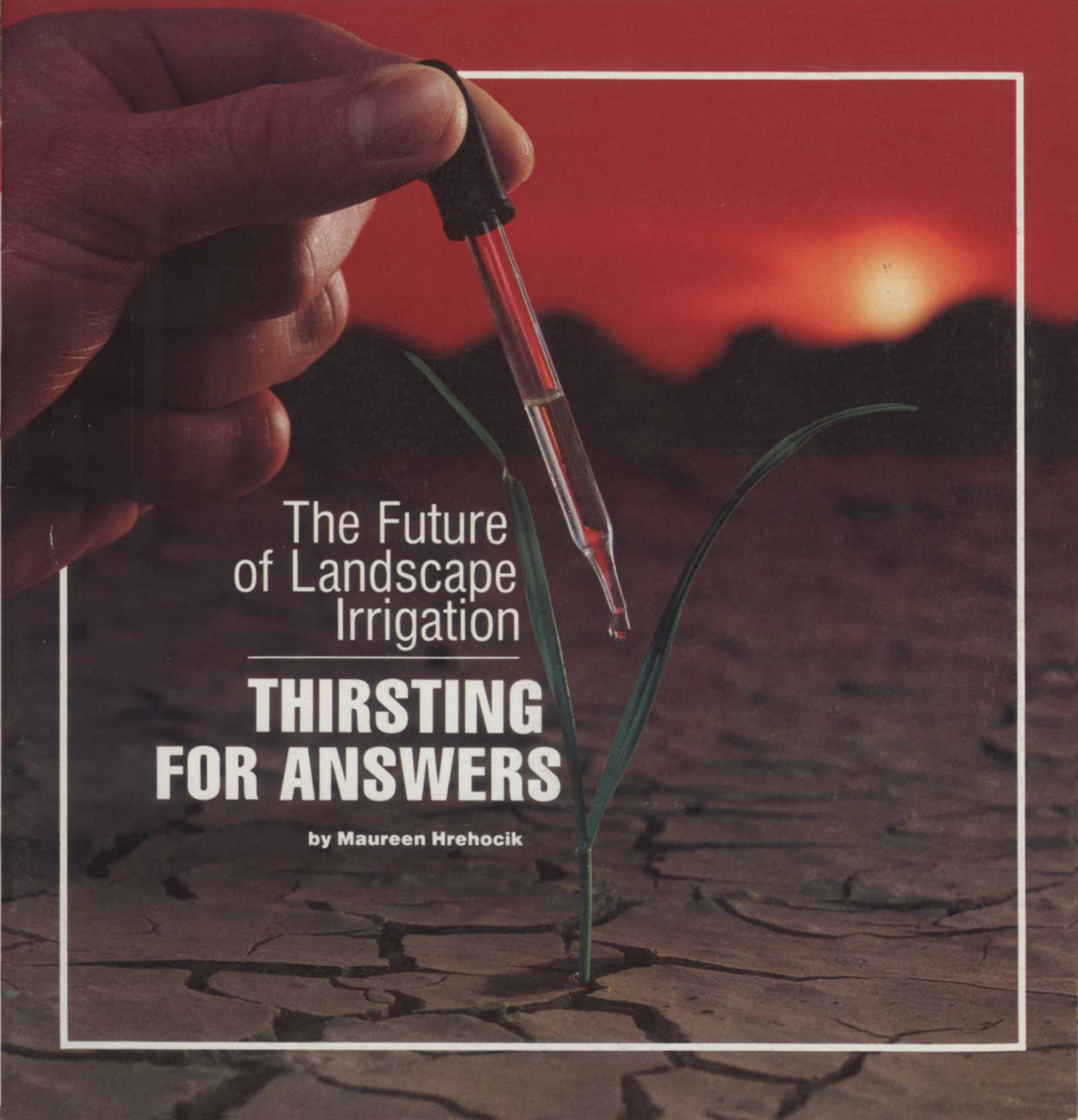
JULY 1984 / $2.00

WEEDS TREES & TURF

The Magazine of Landscape and Golf Course Management Since 1962

Landscape Manager's Guide to Perennial Ryegrasses

Winterseeding in the South by Inverrary's Brad Kocher



The Future of Landscape Irrigation

THIRSTING FOR ANSWERS

by Maureen Hrehocik

Dursban can make call-backs a thing of the past.

There's a phone call you shouldn't have to take ever again. The one that calls you back to redo a lawn or turf job. The one that costs you dearly in labor, time and gasoline. Not to mention the highest cost of all—the unhappy customer.

You can put all that behind you by using DURSBAN* insecticides. Because once you use DURSBAN you can be sure you're getting up to eight weeks of tough, broad spectrum insect control.

You can count on DURSBAN 2E and 4E liquids or new 50W wettable powder to knock out the toughest and most persistent outdoor insects. DURSBAN gets them all.. sod webworms, armyworms, chiggers, chinch bugs, clover mites, crickets, ants, grasshoppers, mosquitoes, grubs, turfgrass weevils, billbugs and more—the first time around. It's hard to find an insect that DURSBAN insecticide won't control.

Unlike slower acting insecticides, DURSBAN goes to work as soon as applied ...spring, summer or fall. And for as little as $3.50 per 10,000 square feet of lawn or turf, it's a lot cheaper than the cost of call-backs.

With DURSBAN insecticide on the job, more of your calls will be for repeat and new business. While call-backs become a dusty memory.

Give your Dow distributor a call for DURSBAN insecticide. Also ask about the "DURSBAN delivers the goods" incentive program. Be sure to read and follow all label directions and precautions. Agricultural Products Department, Midland, Michigan 48640.

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Does it right the first time.

DOW*

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3918

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JULY 1984 VOLUME 23, NUMBER 7

WEEDS TREES & TURF

The Magazine of Landscape and Golf Course Management Since 1962

34 Landscape Manager's Guide to Perennial Ryegrasses

Gerald W. Pepin, director of research for Pickseed West offers information on all aspects of ryegrass. Establishment, color, winter seeding, disease resistance, leaf texture and mowing quality are a few of the areas he covers. Full descriptions of different varieties are also offered.

18 Thirsting for Answers—Part I

Water for the Green Industry is becoming a shrinking commodity. The reasons are many, but so far the solutions are few. Part I of this two-part series focuses on some problem areas in the current water situation. Part II next month, will look at some of the answers.

48 Winterseeding: The Greening of Inverrary

Planning and solid turf management are Superintendent Brad Kocher's secrets of success for overseeding his course, Inverrary Country Club in Lauderhill, FL. Kocher will take you through a step-by-step procedure for the annual fall ritual for most Southern courses.

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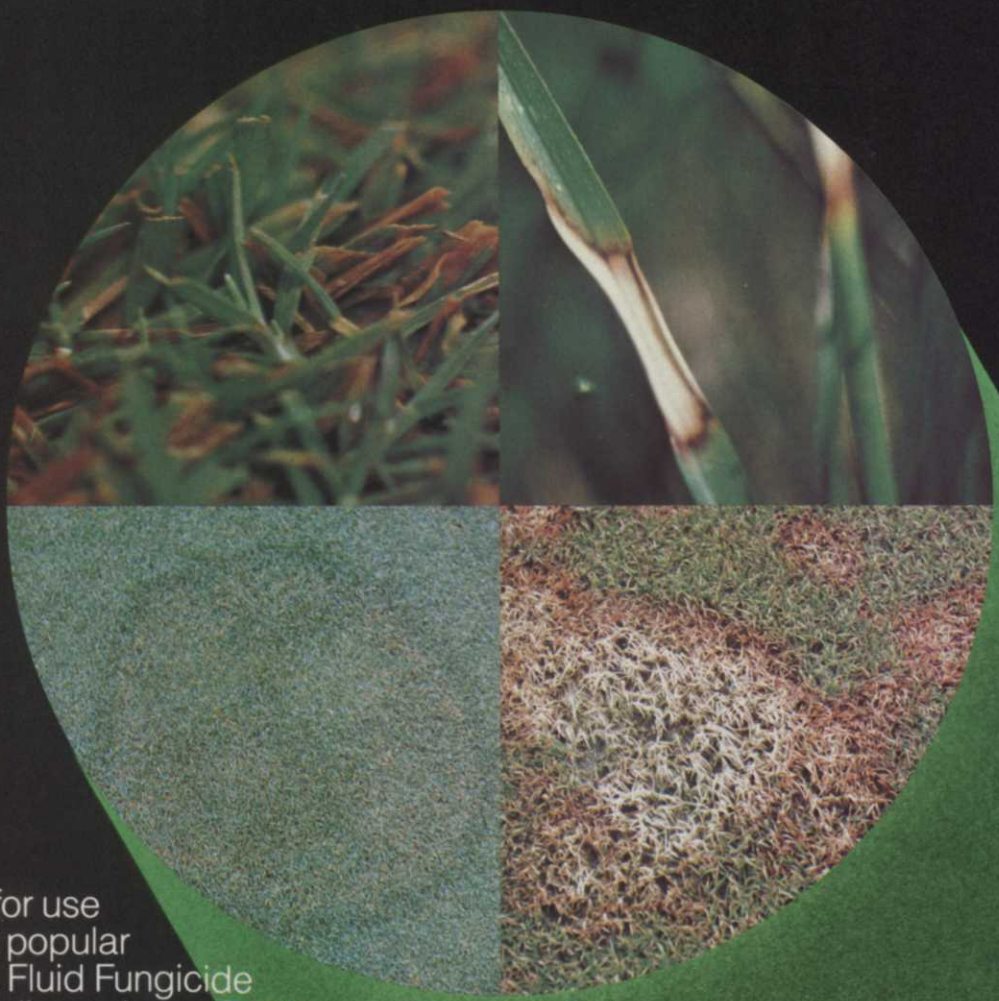
Scotts® has developed a flowable fungicide that produces results equal to those from a complex program of six leading fungicides. The unique combination of active ingredients in Fluid Fungicide controls and prevents red leaf spot, dollar spot (including benzimidazole tolerant strains), brown patch and pink snow mold.



Developed for use on the most popular turfgrasses, Fluid Fungicide adds a new dimension to Scotts traditional dry, granular approach to turf maintenance. To find out about all its advantages, call your local ProTurf® Tech Rep.

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Cost Effective Flowable Fungicide

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How to unload bushels of clippings single-handedly.

Introducing two new John Deere material collection systems-Hydraulic Dump and Tilt Dump.

A load of grass clippings should be as easy to empty as it is to cut.

That's why we've developed two new material collection systems for John Deere 300 and 400 Series Tractors.

Both systems let you collect and empty leaves and grass clippings without ever touching them. To unload, you simply move one lever and the contents empty automatically.

The John Deere Hydraulic Dump system has a 13-bushel hopper that raises for dumping into a wagon or dump truck. By operating the convenient hydraulic control from the driver's seat, you make the container raise, turn over, empty, and then return to the original position.

The new Tilt Dump system is designed for slightly smaller jobs. With one hand you unlock the latch. The hopper tilts by itself and its back swings open, dumping the load. Then pull the hopper back to its original latched position—all without leaving the tractor seat.

In both systems, a PTO-driven fan loads the hopper more quietly and efficiently than engine-driven competitive makes. And fan speed is variable from 2,800 to 5,200 rpm, matching the speed to operating conditions. Slower for dry, dusty conditions; faster for damp leaves or grass.

If you're ready to move up to a system that lets you do more and bigger jobs with a minimum of extra work, then a John Deere Hydraulic Dump or Tilt Dump system is for you.

For the name of the nearest dealer, or a free folder on the John Deere material collection systems, call 1-800-447-9126 toll free (1-800-322-6796 in Illinois) or write John Deere, Dept. 50, Moline, Illinois 61265.

Check out our new John Deere material collection systems. Because grass isn't the only thing that needs cutting.

Your work does, too.

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Remember the name because you're going to hear a lot about it. Fylking Kentucky bluegrass lawn is something special. It forms a dense, thick turf, more disease and drought resistant. Greens up earlier, stays greener longer. Fylking can be cut as low as ¾ inch, even ½ inch for home putting greens. Proven over many years of international certified testing. Ask your seed distributor for Fylking.

Fylking — the World's Fair grass.

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U.S. Plant Patent 2887

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Subdue. The most effective fungicide against Pythium blight and damping-off.

Pythium weather. High temperatures, high humidity and high anxiety. Once Pythium takes root, it can destroy turf within hours.

Unless you take a grass-roots approach to Pythium. With Subdue.®

Subdue works both on contact and systemically.

Subdue fights Pythium blight and damping-off—as well as downy mildew (yellow tuft)—in two ways. On contact, Subdue destroys the fungi in the soil. Systemically, Subdue prevents disease from within grass plants. That's because Subdue is water soluble—easily absorbed by roots. So Pythium—and now, downy mildew—don't have a chance.

Subdue also controls costs.

Subdue's systemic action means longer, more effective residual protection. Fewer applications. Lower chemical costs. And savings in maintenance and labor. And Subdue's low application rate—1 to 2 fluid oz. per 1,000 sq. ft. for 10 to 21 days on established turf—makes Subdue the most cost-efficient protection you can buy.

Before Pythium weather strikes, subdue it. Use Subdue in a preventive maintenance control program. And get a good night's sleep.

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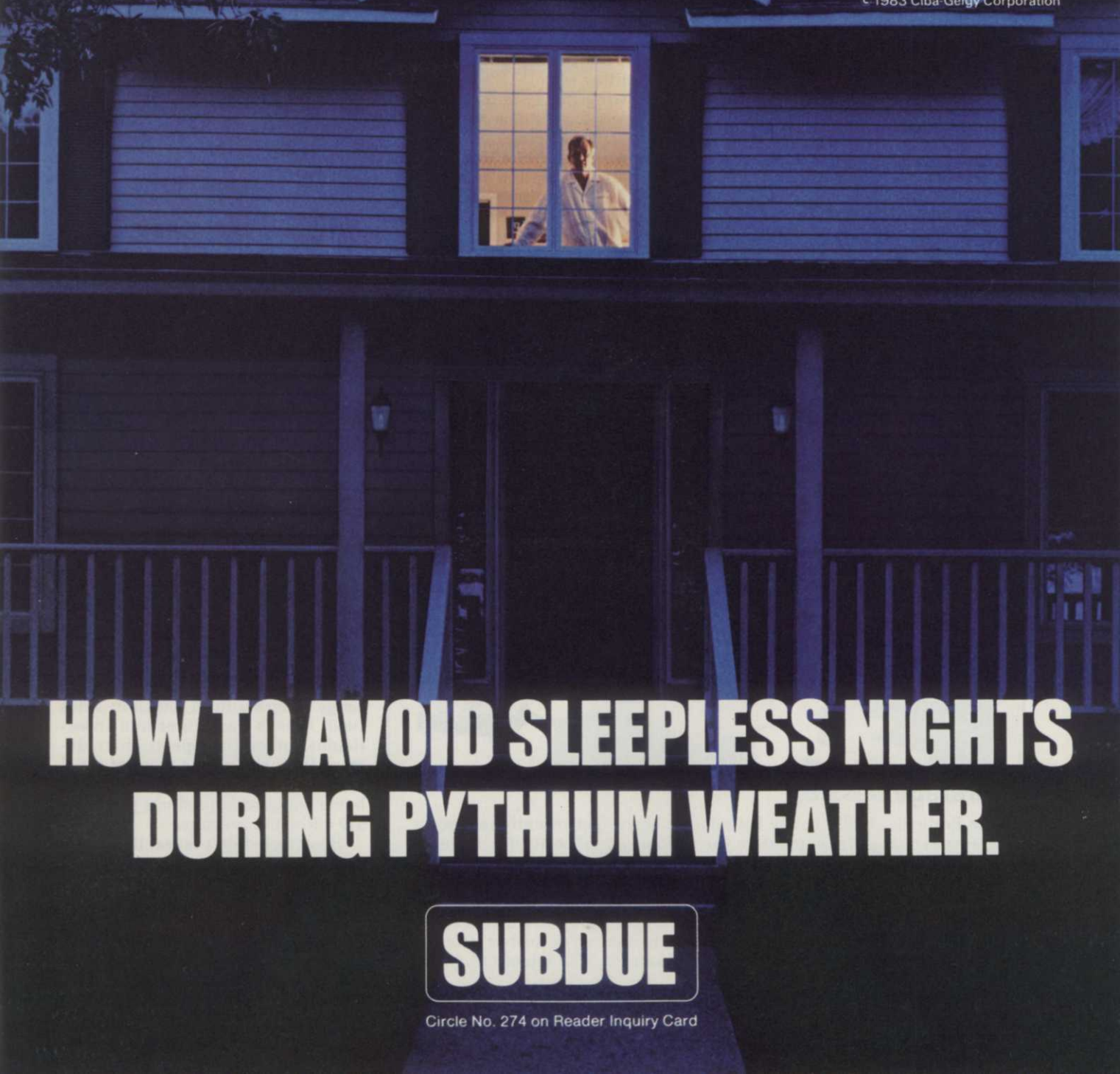


HOW TO AVOID SLEEPLESS NIGHTS DURING PYTHIUM WEATHER.

SUBDUE

Circle No. 274 on Reader Inquiry Card

AWARDS

70 receive AAN awards from Mrs. Reagan

The sun shown brightly on the East Garden of the White House as more than 70 landscape individuals received American Association of Nurserymen Awards from Nancy Reagan in May.

The award winners were recognized for their "significant contributions" in the area of environmental design and improvements at the 27th Landscape Awards Program. This was the eleventh time in the program's history that a First Lady has presented the awards and the seventh time the event has taken place at the White House.

Mrs. Reagan apologized to the crowd of around 300 for being late, "but my son called from California, and you know how that can be."

After Mrs. Reagan's brief opening remarks, Robert F. Lederer, executive vice president of the AAN, praised the award winners' contribution to landscaping and Mrs. Reagan for consenting to present the awards.

"When the American Association of Nurserymen was formed, 109 years ago, a newspaper editorial said, 'It is right that everyone who can be induced to plant a good, honest tree and pay for it should be coerced into doing it,' " said Lederer, "These ladies and gentlemen you will be meeting are here because they have planted 'good honest trees.' "Recipients of the awards represented the sponsors, landscape architects and installation firms responsible for 21 environmental landscaping projects in 17 different areas of the nation. The outstanding feature of these projects, according to the AAN, is their positive effect on the quality of life in their communities.

Following the awards ceremony, guests were treated to a reception in the State Dining Room.

Following the White House reception, another reception was held at the JW Marriott where Secretary of Agriculture John Block and his wife, Susan, were guests of honor.

"I'm going to count each and every one of you as farmers because I need all the farmers I can get," Block joked. He praised the industry for its many contributions.

First Lady Nancy Reagan *looks on as American Association of Nurserymen Executive Vice President Robert Lederer gives the opening remarks at the recent AAN awards ceremony at the White House.*

Strategy session

The Pesticide Public Policy Foundation board met recently to discuss strategies to organize support for the national use of pesticides. Pictured from left are Bob Felix of the National Arborist Association, Inc.; Bob Bartlett of Bartlett Tree Experts; and David Dietz, PPPF executive director. Dietz reported that the PPPF hotline receives eight to 10 calls a day from professional presticide users around the country asking questions about how to fight pesticide legislation in their area. For further information about PPPF, write or call 1270 Chemeketa St., NW, Salem, OR, 1-800-GET-PPPF.

CHEMICALS

Ciba-Geigy to sell part of ag division

Ciba-Geigy Corp., Greensboro, NC, will sell its home and garden chemicals production business.

Emilio J. Bontempo, vice president, marketing, of the division, said marketing consumer-oriented products does not fit the long-range plans of the division, which is primarily engaged in the production and sale of agricultural chemicals and seed.

The home and garden business has been operated as a part of Ciba-Geigy's Agricultural Division since 1960. It sells herbicides and insecticides under the Spectrum trademark through various types of retail outlets. Last year the unit's sales of home and garden products produced $19 million in revenues.

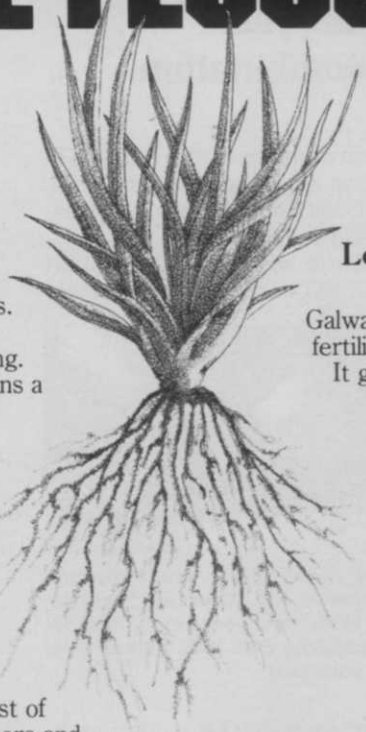
Bontempo didn't reveal the asking price for the business.

INDUSTRY

Lesco files for initial offering

Lesco Inc. filed in May with the Secu-

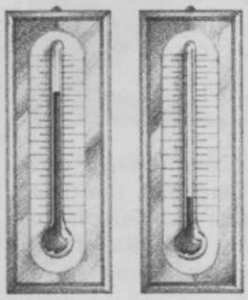
NORTHRUP KING'S GALWAY WILL CHANGE YOUR THINKING ABOUT TALL FESCUES.



Until now, most tall fescues have come up short.

They've failed under extreme temperatures. And fallen victim to disease.

But now there's Galway from Northrup King. A versatile, fine-leafed tall fescue that maintains a dense weed-free turf years after ordinary tall fescues thin out.



Improved performance against disease and extreme temperature.

In development, Galway passed the test of fierce Minnesota winters and sweltering Midsouth summers.

It passed the test at several northern and southern universities, too, ranking among the best turf-type tall fescues available.

Tests have shown that it won't succumb to brown patch or net blotch. And that its improved shade tolerance makes it well suited for use under trees and in other low-light areas.

Low maintenance turf with a high maintenance look.

Galway requires only limited amounts of water and fertilizer to produce an attractive, dark green turf. It grows slower, which means less mowing. And its improved fine-leafed texture improves density and uniformity.

It is recommended for athletic fields, parks, playgrounds, commercial and public turf areas, boulevards, embankments and home lawns. New, fine-leafed Galway from Northrup King. It'll change your thinking. Because, in the world of tall fescues, it stands above them all.

MEDALIST TURF PRODUCTS

Ask your Northrup King distributor about Galway tall fescue. Or write Northrup King Medalist Turf Products, P.O. Box 959, Minneapolis, MN 55440.

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When the turf looks sharp, so do you. The HUSTLER 261/BAC-VAC™ combination is worth the difference.

The HUSTLER 261/BAC-VAC combination provides a finished job that looks sharp and that's a very good reflection on you.

The agile HUSTLER 261 with BAC-VAC grass vacuum precisely cuts, trims and vacuums turf in one operation. When full, the 16-bushel capacity hopper empties with the release of a single lever. You never leave the driver's seat and in moments you're back mowing again.

HUSTLER's exclusive 60" 3-Way Deck, with a 9.5-inch offset design, lets you trim closely between and around low hanging trees and shrubs, providing the finest cut on turf. It even picks up leaves in the Fall!

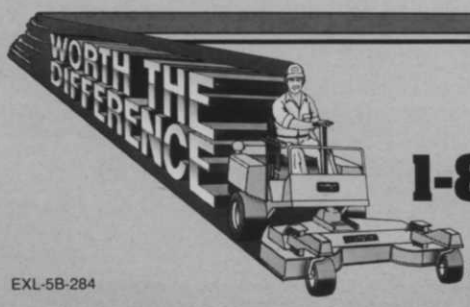
Providing a fine cut, vacuuming and edger capabilities, the HUSTLER 261/BAC-VAC is the complete package for landscape contractors.

In addition to this flexibility, here's performance confidence! The Briggs & Stratton warranty on the HUSTLER's 18 hp drive engine, and its 5 hp auxiliary BAC-VAC engine, has been extended to two full years.

It's plain to see why the HUSTLER 261/BAC-VAC is...worth the difference!

A spinner device gives visual indication the hopper is full. Then an "easy-to-reach" lever lets you empty the 16-bushel capacity BAC-VAC without ever leaving your seat.

There are six HUSTLER models ranging from 18 to 32 hp with a host of attachments to meet year-round needs.



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EXL-5B-284

rities and Exchange Commission for an initial offering of 650,000 common shares expected to be priced at $11 to $13 each.

"The number one reason for going public is that it gives a company another way of raising money—equity financing," said Jeff Jones of McDonald & Co., Cleveland, OH, which is managing the underwriting group.

"A company's got to do a pretty good job of impressing us about its ability to be profitable and to grow for us to consider them," Jones continued. "This also gives them more visibility in the marketplace and gives them a value. They've gotten to the point—almost $400 million worth of sales a year—that equity financing is a nice alternative to bank financing."

EQUIPMENT

Computer streamlines Jake's parts delivery

The turf industry's first computerized system that links distributors with an equipment maker to speed delivery of spare parts and finished goods is now on stream, according to Jacobsen Division of Textron, Inc.

Called REACT (Remote Entry and Customer Order Tracking), the new data system operates over telephone lines to reduce order entry time from sometimes days by mail to less than 30 seconds.

Besides swiftness, Jacobsen's Customer Service Manager Jerome H. Betker says, "It's far more accurate, allows for fast order verification and eliminates slow and tedious paperwork."

Distributors in the REACT network have a portable desk top Epson computer with integral keyboard for entries and video screen for simultaneous display of data input. They also have printer and telephone modems that, repectively, lets them gener-

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New Du Pont Landscape Fabric. It lets water through to give you healthier beds with less work.

New DuPont Landscape Fabric lets water pass through, reduces wash-away of mulch while it impedes weed growth. So you get healthier, more attractive plant beds with less maintenance work and cost.

Everything you apply for bed care gets to plant roots in the amount you want, where you want it. Water, fertilizers, herbicides and pesticides seep down through this chemically inert fabric to nourish and protect every plant in your bed.

DuPont Landscape fabric is easy to put down with scissors or knife. It comes in four roll sizes from 3- to 12-feet wide.

Call 800-441-7517 for the name of the nearest distributor and more information about DuPont Landscape Fabric. Or write DuPont Company, Room G-40955, Wilmington, DE 19898.

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DU PONT

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ESTECH SECRET NO. 6

"Korea's leap years.

The years, 1964 to 1984. The country, Korea. And the company that helped this war-torn nation leap 100 years in agricultural technology, ESTECH.

Through our joint venture in the Yong-Nam Chemical Company, ESTECH continues to help Korea make major advances in fertilizer production and farming technologies.

Perhaps an even more important part of our venture is its sponsorship of a Korean organization already quite familiar to American children: 4H. To make sure these strides keep right on happening.

So why keep quiet when there's so much to tell? That's the secret of our success . . .

At ESTECH, we don't talk. We just do."

Estech, Inc.

We'll share some equally revealing secrets about Professional & Commercial Fertilizers. Call Irv Stacy, National Sales Manager, Par Ex 813/533-1181

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ate hard copy and transmit orders to Jacobsen.

Betker reports that since being introduced six months ago, nearly 50 percent of Jacobsen's U.S. distributors are now part of the REACT network with the remainder coming on stream according to the plan.

"With spare parts being of vital importance to turf and grounds care people, we wanted to assure rapid delivery using the best techniques modern computer technology has to offer," Betker said.

TURFGRASS

Heart attack claims U of C's Youngner

Dr. Victor B. Youngner, professor of agronomy at the University of California, Riverside, died April 18 of a heart attack. He was 61.

Youngner was well-known in the turf industry for his work with zoysia grass. This year, another one of his zoysia's, El Toro, will be released.

A native of Nelson, MN, Youngner received his B.S. degree in horticulture, ornamentals and landscape design and his Ph.D in plant breeding and plant genetics from the University of Minnesota.

In 1955, after being a flower and vegetable breeder, he went to UCLA and began turfgrass research. Ten years later he went to the Riverside campus.

"Teaching is not one of my priorities," Youngner told WEEDS TREES & TURF shortly before his death. "I've always been a researcher."

One of his former students and colleagues, Dr. Kent Kurtz, a professor of horticulture, Cal Poly, Pomona, said Youngner was "a great person, extremely helpful and very patient, who thought a lot of his colleagues."

Kurtz is currently working with 12 of Youngner's cultivars.

EQUIPMENT

Deere builds millionth tractor

John Deere completed work on the company's one millionth lawn and garden tractor on May 1 at its manufacturing plant in Horicon, WI.

The millionth tractor was an 18 hp model 318.

Production of lawn and garden tractors began at Horicon in 1963 when John Deere built 1,000 units. The first tractor was a 7 hp model 110 that's now on display at the Smithso-

UNBEATABLE CUT, UNBEATABLE PRICE.

INTRODUCING THE LOCKE PROFESSIONAL.

Locke, the name that revolutionized the home landscape industry with the technologically revered triplex reel mowers, is making news again!

Introducing the new Professional. The first Locke mower designed especially for large grounds where a precision cut is mandatory, like golf courses, playing fields and other fine grounds.

THE FIRST REEL MOWER WITH A REAL DIFFERENCE.

Up until now, the only way to get a superior, high-quality cut was to buy an expensive hydraulic reel mower. The Locke Professional has changed this.

The Professional has a proven mechanical cutting system that delivers a great looking turf that is sure to meet the standards of even the most discriminating golf course superintendents.

Incredibly, the Professional delivers this unbeatable cut at an unbeatable price. With the Professional, you can save thousands of dollars versus the cost of hydraulic reel mowers.

BUILT STRONG FROM THE INSIDE OUT.

One look at the Locke Professional and you know it was built with extraordinary quality...engineered for reliability and durability.

The Professional offers a broad range of features designed to give you maximum performance: ⅜–2½ inch cutting height, up to 87 inch cutting width, grass catchers and micro-reel adjustments. Features that will help you cover more ground in less time.

If you're considering a new mower, discover the reel mower with a real difference. Discover the Locke Professional and get an unbeatable cut at an unbeatable price.

Contact Locke for your local authorized dealer, today, at (203) 333-3157, 1100 Boston Avenue, Bridgeport, CT 06610

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GOVERNMENT UPDATE

EPA registration holdup lags

At presstime, there still is no decision from the Supreme Court on the Monsanto/EPA data compensation case. This one case, heard months ago by the Court, is slowing registration of new uses and pesticides.

Chemical companies are not satisfied with the way EPA law judges have been figuring compensation from "me-to" registrants to data originators. EPA has told the Court data submitted for registration purposes becomes the property of EPA and not the applicant. Meanwhile, registration applications based upon data developed by companies other than the applicant, are frozen and some previous "me-to" registrations are being nullified.

Chemical companies want protection for the years and millions of dollars they spend to get a chemical to market. One ray of hope is a bill by Representative Michael Glickman (R-OH) which, if passed, could add five more years of patent protection for chemicals. This will make up for patent years lost in the EPA registration process and is supported by the National Agricultural Chemicals Association.

Groundwater causes new testing

Concern over groundwater contamination is the reason EPA asked recently for additional data on 84 pesticides, including many landscape herbicides, fungicides and insecticides.

Chemical companies without this data, may have to perform up to eight additional tests to keep their products registered.

Environmentalists are pushing EPA to fill gaps in pesticide data. EPA Assistant Administrator for Pesticides and Toxic Substances Dr. John Moore expects nearly ten percent of the pesticides needing more data will be voluntarily cancelled.

Moore said products with poor groundwater test results will face geographic restrictions and companies failing to supply the new data will find it hard to obtain registration for new uses.

Local pesticide regs get bounced

Some local pesticide laws are being struck down in Court on the basis pesticide regulation is limited to state and Federal agencies.

The Pesticide Public Policy Foundation (3PF) has revealed laws in Brooklyn, NY, requiring application permits, and in Mendacino County, CA, banning aerial applications, were struck down by Appellate Courts.

These early rulings will set precedent for future decisions. 3PF, which keeps track of pesticide legislation nationwide, believes local agencies are too political and only state and Federal agencies are enpowered to regulate pesticides. Those confronted with pesticide regulatory problems can contact 3PF by calling 1-800-GET-PPPF.

nian Institute in Washington, D.C.

It took the company 14 years to reach the half-million milestone on Jan. 12, 1977, but only seven years to build the next half million tractors to reach the one million mark this year.

Mark Rostvold, director of consumer products marketing at John

Deere, said the rapid increase in production numbers results from several trends.

"We're designing more kinds of mowing equipment today to provide greater versatility and a wider selection of features and prices. In the late 1970s we offered only one model lawn tractor for example, while today we have seven.

Raymond E. Gregg Jr., general manager of the Horicon Works, said that the factory has grown with increasing sales.

"Plant area has increased by 81 percent and average yearly employment has more than doubled over the years. The Horicon Works has become one of the most profitable factories in the John Deere system, while becoming the largest manufacturer of lawn and garden tractors in the world."

TREES

Arboretum curator retires from Secrest

John E. Ford, curator of the Secrest Aboretum, Wooster, OH, retired in February.

Ford remains an active member of a number of professional organizations. These include the Society of American Foresters, American Horticulture Society, American Association of Botanical Gardens and Arboreta, Ecological Society of America, Holly Society of America, and National Audubon Society.

In 1976, Ford was one of the 200 U.S. citizens selected by the Royal Horticultural Society of England to receive a Fellowship in the Society in honor of the American Bicentennial. Those slected were eminent horticulturists, botanists or representatives of leading American horticultural institutions or organizations.

"We've put them to the test: Sta-Rite submersibles are proven the best for our golf course installations."

EDWARD A. ETCHELLS,
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Small beads of sweat began to collect above Pat Berger's eyebrows.

The sun glinted off the powdery white earth as the superintendent of the El Paso Country Club wet his index finger and touched it to the salty white Texas soil. He put the salt-covered finger to his lips and smiled and shook his head.

"I could scrape this stuff up and put it in my salt shaker at home," he said.

The water spewing out of the sprinkler head looked awfully inviting to the thirsty deliveryman. He bent down and let some of the cool liquid splash his face and roll down his throat.

Duane Janssen still chuckles when he tells the story of what happened next.

"You should've seen his face when I told him he was drinking effluent (treated sewage) water," says the Southwest Texas golf course superintendent.

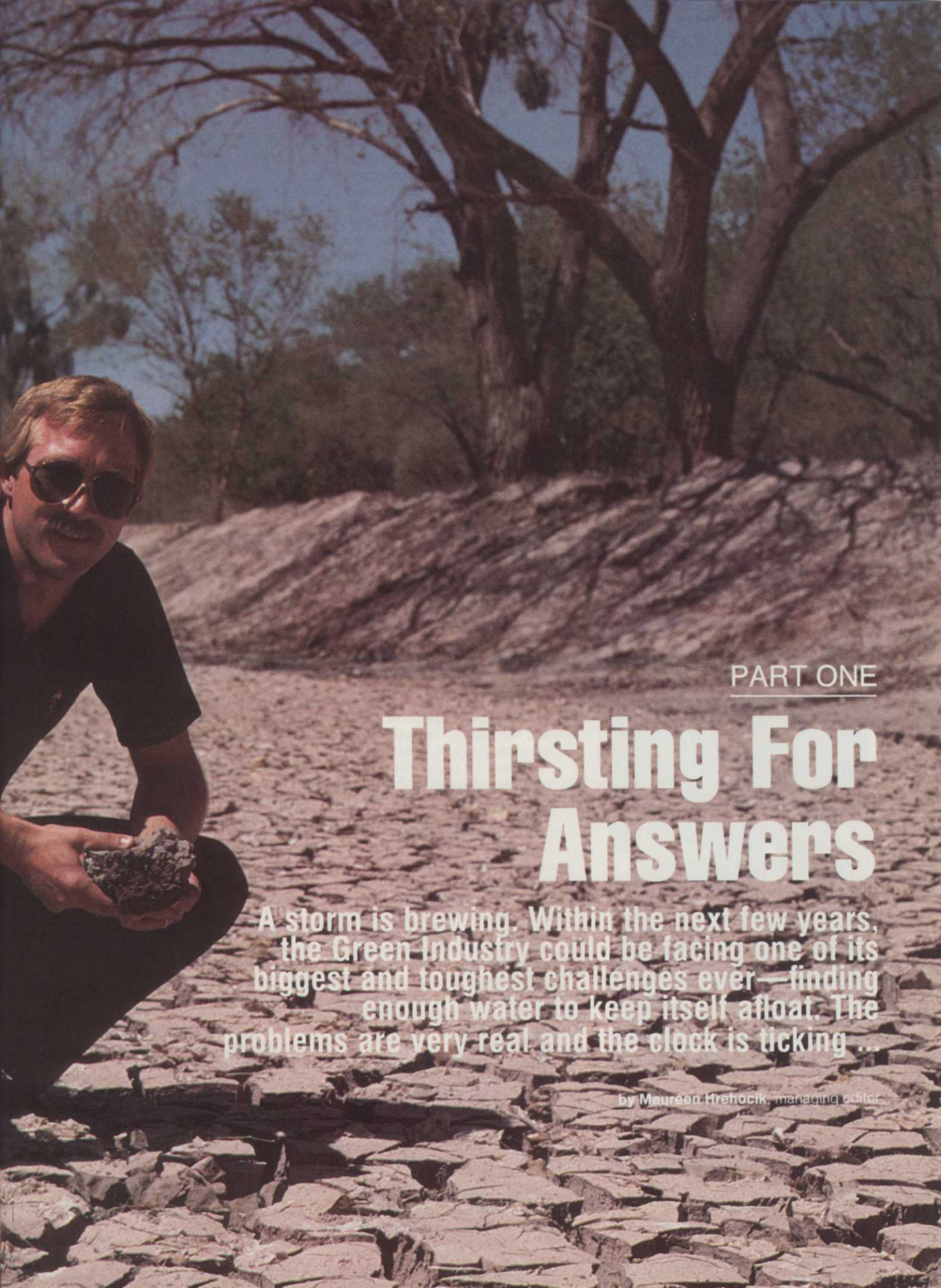
When the unwary deliveryman found out what Janssen was watering his course with, he quickly made tracks to the nearest convenience store for a Coke.

How do you convince a client to spend an extra $80,000 for straw mulch on a golf course in the name of water conservation? Golf course architect Michael Hurdzan was up against just that.

"It's sometimes hard to explain that the benefits will be realized down the road and not necessarily initially," he explained.

The New England club consented, though, not only to the $80,000 for straw mulch but also to $60,000 to divert driveways into a central retention pond to collect rainwater. The club has also adopted other water conserving practices.

Pat Berger, Superintendent, *El Paso Country Club*



PART ONE

Thirsting For Answers

A storm is brewing. Within the next few years, the Green Industry could be facing one of its biggest and toughest challenges ever—finding enough water to keep itself afloat. The problems are very real and the clock is ticking ...

by Maureen Hrehocik, managing editor

Salinity, effluent, water conserving golf course design—only three of a myriad of factors affecting a shrinking, and often-times mismanaged, resource—water.

For the multi-billion dollar Green Industry, water use, quality, quantity and conservation is the lifeblood coursing through its veins.

Golf course superintendents, landscape contractors, landscape architects, irrigation contractors and companies, seed growers, arborists, equipment manufacturers, turf associations and landscape managers are all inextricably bound together by water—and we are using it up and polluting it faster than nature can replenish and purify it.

Couple this with the ominous threat of water rates tripling, quadrupling or going even higher in the next five years and the urgency presents itself loud and clear at our doorstep.

But are we listening?

Slaking the thirst of urban as well as agricultural customers is becoming an increasingly important priority.

A resource that has always been available at the flick of a faucet, that has flowed with unbridled force down the nation's riverbeds and that filled the cavernous underground aquifers, is diminishing—the end result of waste, burdgeoning populations and a sometimes uncooperative Mother Nature.

Aurora, Colorado, for a few years has had not only local ordinances restricting water use for lawns, but also the size of the area that can be planted in grass. Five years ago Arizona's golf courses were sucking up more than 160 million gallons of water a year.

Enough water, but ...

The United States as a whole has adequate supplies of water. Regional and local shortages, though, are an imminent possibility.

No one can guarantee where rain will fall. No one can predict how large the snowpack will be. Nature holds all the cards and trying to predict good weather is like trying to draw to an inside straight.

The problem, while more severe in certain areas, is by no means limited to one part of the country.

In this issue, WEEDS TREES & TURF will take a look at a few of the facets of this multi-faceted problem—salinity, use of reclaimed water, use of effluent, and golf course and landscape design in three key geographical areas where water is critical—Texas, Florida and California. (These three states alone, and Idaho, account for 25 percent of the water used nationally.)

Next month, we will look at some solutions to the water crunch through turfgrass research, concern by irrigation companies and involvement by Green Industry associations.

The overall picture, while serious, looks hopeful, mainly because of the far-sightedness of Green Industry individuals and associations. The problem, however, is by no means solved.

The greatest challenge, that of implementation and additional research, yet remains. If not met, the future of many businesses, livelihoods, recreational areas and our standard of living itself, could, literally, be slipping down the drain.

Thirsting For Answers

The flood of statistics is staggering. Human consumption of water is a drop in the bucket compared to the whopping 80 percent swallowed up by agriculture in the United States; that translates into 210 of the 450 billion gallons a day used. That 80 percent figure includes much of the water consumption needed by the Green Industry.

You've heard the figures before, but the numbers speak for themselves: It takes 3,000 gallons to irrigate a 5,000-square-foot lawn to one inch, 120 gallons to produce an egg, 300 gallons to produce a loaf of bread, 4,000 gallons to produce a pound of beef.

On the average, it takes about 1,000 gallons to produce each pound of food we eat. Even before packaging, a McDonald's Quarter Pounder takes up 1,427 gallons.

Personal activities, such as flushing the toilet, taking a bath or doing the wash accounts for about 100 gallons a day per person.

Water makes up only 1/10th of 1 percent of the earth's mass. Of that amount, less than 1/2 of 1 percent can be used for human consumption. Most of the world's water supply is locked in oceans (97 percent), polar ice caps (2.2 percent) and underground water reserves too deep to tap (.3 percent).

Nationwide, we are drawing on groundwater resources at a rate of more than 30 trillion gallons every year for agricultural, industrial, municipal and domestic uses.

The Ogallala aquifer is the largest in the world, 800 miles long, 400 miles wide and is located below eight midwestern states. Its peak 650 trillion gallons of water continues to be depleted.

Largest user

Irrigation is the largest consumptive user of water. Per day, 73 billion gallons is taken up by vegetation and transpired as vapor into the atmosphere.

The U.S. Department of the Interior reports the waste and loss of water from public and irrigation supplies is large. About 20 percent of the water withdrawn from public supplies and about 17 percent of that withdrawn for irrigation use is lost before being used, mainly through leaking pipes, mains and irrigation ditches. Altogether, such water losses in just these two categories account for an average of almost 30 billion gallons per day.

continued on page 22

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They apologize for not always being in when you call, but great stories are found in the field, not in the office. These pros know the only way to really cover the green industry is to get out and be a part of it. From turf test plots in Oregon to the corridors of our Nation's Capital, they're following leads, surveying markets and interviewing the landscape professionals who make our industry hum. Then, they use their years of experience to pull it all together, analyze it and present it to you in a crisp, easy-to-read and easy-to-use style. That way, you have the information you need to do your job better, faster and more effectively.

The next time you want to know something in the green industry, give them a call. If you can't reach them at the office, don't worry. They'll reach you in the pages of ***WEEDS TREES & TURF.***

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CALIFORNIA

Losing a water source, but gaining reclamation momentum

Ed Thornhill is the kind of guy who takes things in stride.

You can tell by the ease in his voice and the fact that, after 19 years with the Metropolitan Water District in Los Angeles, (most recently as principal administrative analyst), he hasn't blown his cool being in one of the hot seats in the California water situation.

Another fire, though, is brewing.

The MWD is a wholesale water supply agency, having no retail customers. "We supply water only after our customers use up their own local supplies," explains Thornhill.

The district currently serves six counties representing 13 million people.

"We have two major supplies of water: local water which accounts for about 1/3 and imported which accounts for about 2/3. Our imported water comes to us from the Los Angeles aqueduct and that water is for Los Angeles use only. The Colorado River aqueduct is owned and operated by the MWD."

It's vying for the bounty of the Colorado River that has come into hot contention.

Agapantha, *shown at top, is a low water use plant which is used extensively in Irvine, CA, landscapes. Ice plants, lower photo, are also used for their low water use as well as providing vivid color.*

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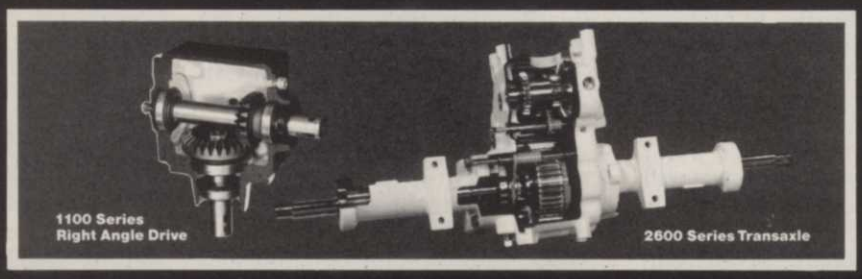

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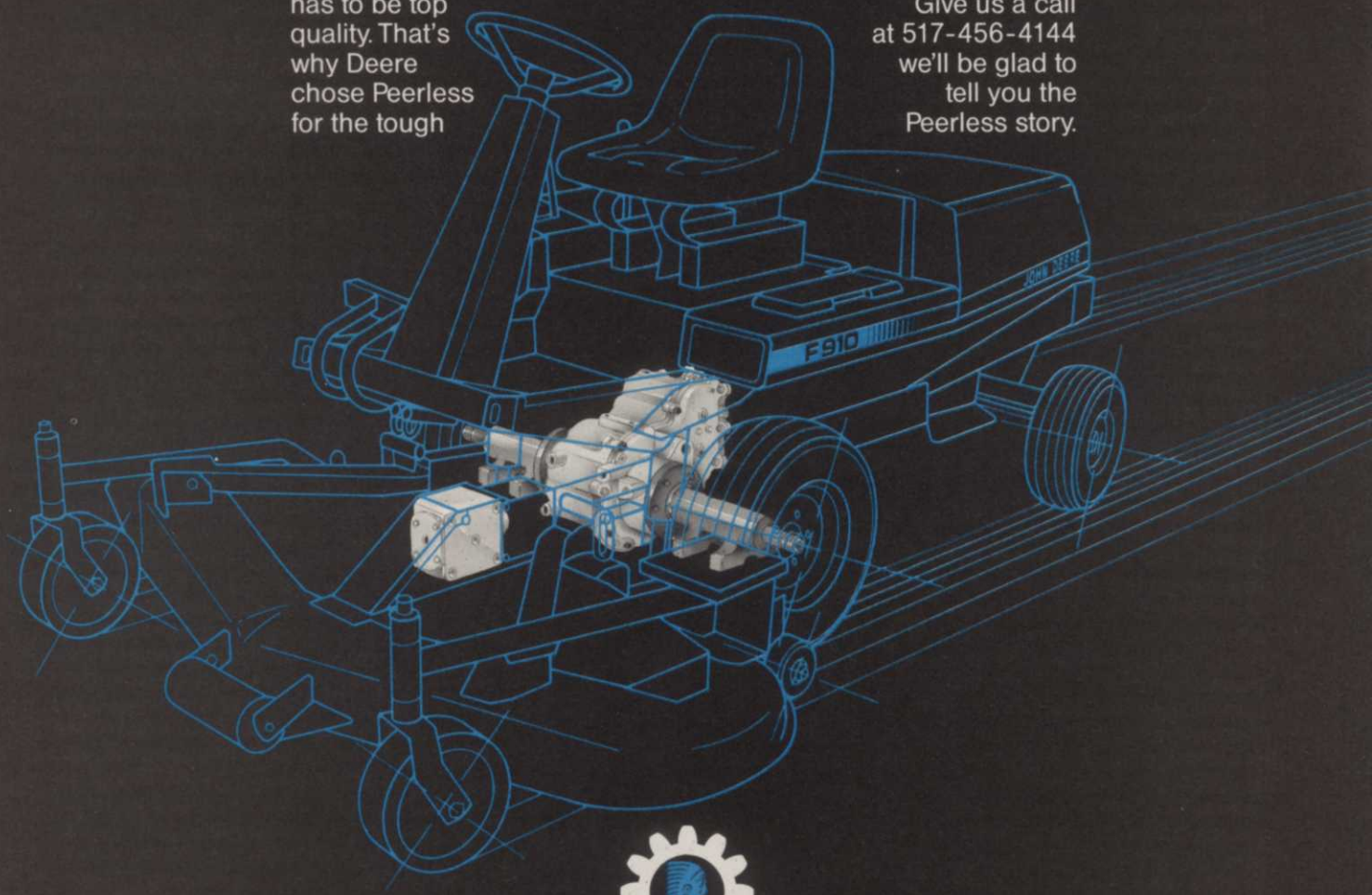

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Sealing fate

Southern California will soon be feeling the effects of a 1964 U.S. Supreme Court decision that said California's allotment from the river was too much. It, therefore, by judicial decree, will lose 662,000 acre feet to Arizona; a little more than 1/2 of what California now gets. Completion of the Central Arizona Project, a major aqueduct system, will seal the fate of that portion of Southern California's water supply. Completion of the project will take another two to three years.

"Losing the Colorado River water isn't really the problem," says Thornhill. "We've contracted with California's water project for an additional 500,000 acre feet, bringing our total from that source up to 2 million acre feet. The problem is we're one of 30 contracting for the state's supply. The state's water plant is only half complete and will take another 10 to 20 years to finish. We lose our Colorado River water in two to three years. We need to complete the state's water project faster."

Thornhill says the department knows what has to be done. It is currently working on legislation that would speed up the work.

"If we get started quickly, we'll be in good shape," said Thornhill, "but if we have a severe drought, we could be in big trouble."

The memories of the '76-'77 drought that brought parts of California to its knees is an all-too-recent reminder.

"People have a tendency to take water for granted," Thornhill theorizes. "Water in California costs less than 25 cents a ton; that's a relatively inexpensive rate."

However, the rate of apathy has escalated.

"People waste because water is cheap," Thornhill continued. "It's too bad we need a crisis before we act."

Legitimizing a dark horse

Irvine, California, hasn't waited for any crisis to act.

This city of 120,000 in Orange County is one of the fastest growing areas in the country. It is also a pioneer in using reclaimed water for irrigation purposes. Fifty percent of its irrigation water is reclaimed. For the past seven years, a trendy city in Southern California has shown water can be used over and over again.

Masterplanned in advance as part of the Irvine Ranch General Plan 20 years ago, its planners had in mind from the beginning that Irvine would not become another urban blight on the California landscape.

The city was carefully mapped out for controlled, systematic growth. Because Irvine is in a desert area and gets an average of 14 inches of rain a year, the big incentive to conserve is lack of groundwater. What little groundwater that's available is brackish and saline. Its other water sources are the Colorado River flowing 350 miles away and water from Northern California aqueducts.

"Reclaimed water is no longer a second class citizen," says Joyce Wegner-Gwidt of the Irvine Ranch Water District. "It has been legitimized."

That legitimization now includes 410 clients for the District, (mainly developers) using 3,500 acre feet of reclaimed irrigation water. This massive irrigation system is overseen by Matt Lovein, irrigation supervisor, planning and development, of the IRWD.

"We really had to more or less rewrite the rules and regulations concerning use of reclaimed water," says Lovein. "In the past five years water rates have doubled. In the next five years they'll probably double again."

"The way we're using reclaimed water is an energy-intensive project, but the cost will even-out in the end," he explains. "Energy is the key to a finite water supply."

Taking the lead

Dan Heiny seemed a little out of his element. Sitting on a wooden bench in the middle of an Irvine shopping mall *talking* about what he does was like Picasso trying to explain how to paint a masterpiece.

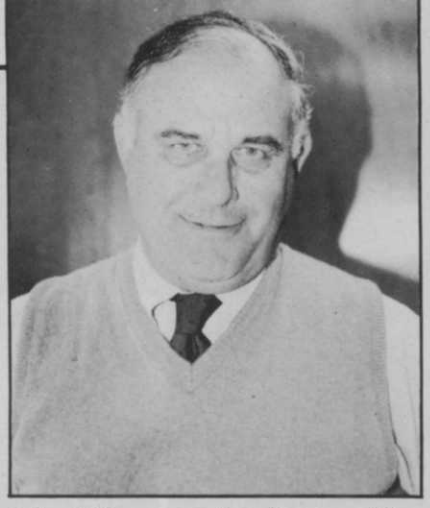
His calloused hands belie the fact he prefers to be working on-site or tinkering in his backyard "laboratory" testing new irrigation equipment.

Heiny is the landscape manager for the Irvine Co., a land planning development and management business, which is doing most of the developing of the 90,000-acre Irvine Ranch into the nation's largest master-planned urban community.

As landscape manager, Heiny is responsible for the company's commercial portfolio of 11 million square feet of commercial landscaping. Included in that are 15 apartment complexes, 34 office buildings and 11 shopping centers.

Executive Park was a different story. The 10-acre office complex was more a water managed project than a water conservation one.

"It had bad salt problems," said Heiny. "We had to apply water to flush out the root zone. We did daily tensiometer readings. We only watered when the plants told us to." He used compost to help absorb the salt.



John Zoller, *executive director of the Northern California Golf Association*

Because the complex is built on a duck pond, there was no drainage. The project had to be filled in with sand for drainage.

He installed his irrigation heads to offset runoff and also installed cement walls to support flower beds.

"This is one of our most intensive management sites," he says.

Heiny gets much of his plant material contract grown from the Tree of Life Nursery in San Juan Capistrano. The nursery specializes in low water use plant material.

"I came from Northern California and we really didn't have any water problems there," said Heiny. "When I came to Southern California, things changed. My awareness has been raised by being here." He says irrigation is his primary interest.

"I think low-volume sprays are the direction of the future. There is more direct application."

Heiny feels so strongly about it that he has thrown down the guantlet to irrigation equipment manufacturers.

"I have a personal challenge to all irrigation equipment manufacturers. That is to develop a low-volume pop-type sprayhead. I've made my own adaptation, but it could use some refinement. There's a true need for it in the industry. We've typically gone to low volume ag systems instead of homeowner types. We need things that are more adaptable to commercial landscape. There's also a tremendous need to educate vendors to become more aware of low-volume irrigation equipment."

Heiny works extensively with landscape architects.

"Many landscape architects are not really aware of water conserving plants," he says. "Lots are in the mode of thinking they're grey-looking, when that's not the case."

Heiny's irrigation design philosophy calls for no runoff and therefore no overspray.

"That's what's forcing everything

continued on page 28

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Water conserving *landscaping at Bellecourt.*

Dan Heiny of the Irvine Company *and Joyce Wegner-Gwidt of the Irvine Ranch Water District discuss a site.*

WATER *from page 24*

to change," he says. "We have to hit the pocketbook before people really sit up and take notice. Projects going in now are extremely well-designed irrigation-wise. We design for long-term management to reduce labor and maintenance costs."

An example of that is Heiny's use of spring-retractible pop heads, not solid set risers.

"They are inflexible. If one gets broken, the cost of repairing it is more expensive than installing the spring-retractible kind."

"The future is very exciting. Within the next two years, the Irvine Co. will be an absolute leader in water conservation. We have the awareness, knowledge and control aspect."

Northern California

John Zoller's office overlooks the putting green at Spyglass Hill in Pebble Beach.

Looking out the window at the lush seaside bent and poa green, it's hard to imagine this mecca of golfdom has ever felt the searing fingers of a drought.

But it has.

And people remember.

Zoller, for the past five years, has been executive director of the Northern California Golf Association. Its membership includes 293 clubs and 141 associate clubs representing 80,000 individual members.

"During the drought of '76-'77, outside irrigation was banned," he recalls. "We begged and got enough to water the greens only."

"During that time, the weather was so good the droughthy conditions didn't deter golfers. In fact, it increased play."

Superintendents had to contend with this increase in play while being able to do less maintenance.

"If we hadn't been able to keep the greens up, we would have been in real trouble," says Zoller.

Add to that the fact that the five courses which lie in the confines of the Del Monte Forest—Pebble Beach, Spyglass Hill, Cypress, Dunes and the Shore at Monterey Country Club—are more than just expensive playgrounds. They provide jobs for much of the population living in the Carmel/Monterey area. If golf courses aren't up to par, people don't golf and don't fill the hotels and eat the food and indulge in the other amenities of the area.

Silver lining

In one sense, the drought was good, Zoller maintains, because it improved everyone's irrigation attitude and practices.

"Our problem here exists on a year-to-year basis," explains Zoller. "If we go through one winter that's bad, we're in trouble."

The Del Monte Forest area gets no natural rainfall from the end of March to the 1st of December and only 15 inches a year total. Many courses have stopped irrigating the area between the tee and where the fairway begins to save water, according to Zoller. With as much of an "inconvenience" as the dry weather was, Zoller said it wasn't quite as severe in the Pebble Beach area as it was in the Monterey Valley.

Water rates are also becoming a problem. They've tripled and quadrupled over the last five years. A course that used to cost $12,000 to irrigate for a year, now costs $60,000.

For Zoller, the bottom line, in most cases, is over-irrigation.

"Over irrigating courses is one of the primary ways we are misusing a limited resource. It also encourages weeds. What the question really boils down to is aesthetics vs. playability. I don't see anything wrong with having natural areas in a course. You don't need 160 park-like acres when you only play the game on 40."

In the Del Monte Forest area, there is no groundwater available. It is completely at the mercy of the local water company or using reclaimed water. And this area is where Zoller feels the future of the industry lies.

In fact, he thinks California is moving toward using only reclaimed water for any sport turf, rights-of-way, cemeteries and other landscape-related uses.

"We already have a moratorium on drilling wells and a well tax," he said.

In 1979, there were about 58 courses in the state that were using reclaimed water. Now, Zoller estimates that number to have climbed to 75. The real stumbling block is the federal government which hasn't come through with any funding for setting up reclamation plants.

The NCGA is putting its money—and effort—where its mouth is.

It has been funding the Turfgrass Adaptive Research Program at the University of California, Davis, for the past 17 years, this year to the tune of $40,000. The program, under Bill Davis, is primarily aimed at finding low water use turfgrasses.

"Along with the USGA, we must support development of drought-resistant turfgrass varieties. Research and use of reclaimed water are two of the most important things we can be doing."

The TARP program is also doing research on putting greens, various types of sand to use on courses, and compaction tests on bentgrass. All five courses in Pebble Beach have seaside bent and poa greens and Highland bentgrass tees and fairways.

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FLORIDA

Water, water everywhere, but quality is poor

Florida is a microcosm of different water problems.

The pounding Atlantic on the coast brings with it salt intrusion problems. In the western part of the state, where the water table is high, there is impervious rock and drying winds which cause defoliation. The rest of the state has well-drained soils, but water high in total dissolved solids.

Water is abundant in Florida. The problem is quality and a sufficient potable supply.

Because of the state's sand soil, chemical leaching into the groundwater supply has fathered such controversial issues as EDBs leaching from citrus groves into the groundwater. The nutrient-holding properties of sand are also not good, allowing nutrients to leach out. Fortunately, because of the amount of rainfall, salt build up is flushed away. In South Florida, the soil itself has some phosphorous but doesn't move in the soil. Nitrogen and potassium have to be added on a regular basis. The water table is also at four feet, which causes the soil to dry from the top down.

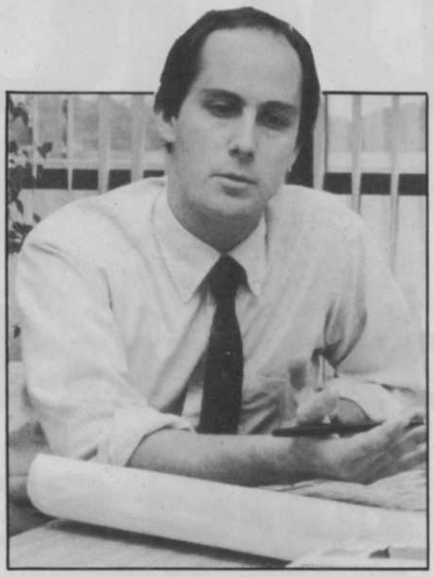
In South Florida, water for irrigation uses comes from city water supplies and pond or canal water. Its aquifer is porous and exposed to the surface.

The northern part of the state is supplied by an aquifer in another state.

Dr. Bruce Augustin of the Institute of Food and Agricultural Sciences, University of Florida, Ft. Lauderdale, says the state has great potential to use effluent, but the local health officer is the major stumbling block.

"There has been such a panic created by other incidents in the past," he says. "It's an unfortunate situation because our effluent is relatively clean. There's no heavy industry and therefore no heavy metal contamination. Effluent is also an unrestricted water supply."

Augustin said effluent use is more predominant in the Orlando and St. Petersburg areas.



Landscape architect *Matt Mathes*

The Palm Beach County Utilities and Engineering Dept. is currently studying effluent disposal and water reuse for eight golf courses in the south county area, as well as for lake recharge.

Changing attitudes

Matt Mathes, a landscape architect with the largest architectural, engineering and planning firm in Florida, Reynolds, Smith and Hills, agrees that effluent use still carries the albatross of "smelly sewer water."

"I think the problem with effluent use is twofold," explains Mathes. "For one thing, there is a real fear of contamination from the source. The second thing is inertia; because it's a relatively new idea, it's hard to accept. The commercial and public client should be leaders in this movement to get it to a more acceptable level."

There's also a cost factor involved. When effluent is being used, dual water mains have to be installed—one for the effluent and one for potable water—and that translates into more cost.

In Boca Raton, Florida, an affluent city in South Florida between Ft. Lauderdale and West Palm Beach, the city's Community Appearance Committee has enacted an ordinance prohibiting staining of concrete from irrigation spray. Because South Florida water is so high in mineral content, if irrigation spray is directed toward buildings and sidewalks, an iron-colored stain is left on the cement.

Taking in the whole water picture of South Florida, Mathes commented, "Maybe our sense of aesthetics must change. Cities can demand too much. Maybe instead of putting use restrictions on certain types of water, we should make brown concrete."

Mathes' point is well-taken. Changing attitudes, whether it be concerning the social acceptability of effluents, the aesthetic appeal of buildings or water usage policies at the local, state and federal levels, seem to be another thread weaving its way through this complicated tapestry.

The competition among Florida's cities to lure prospective residents is intensifying. The general trend has been toward "good-looking" cities with many of them modeling themselves after Boca Raton.

Another water source, lakes, opens up a whole new area of problems—the biological realm. The myriad number of organisms that can spawn and infest plants once the water is applied is mind-boggling. This irrigation source, however, is prevalent among residents. In fact, according to Mathes, it's their number one choice, when available, for irrigation use.

"There's a lot of apathy to contend with out there," he says. "There have been signs of an increased awareness, though, in water conservation. People are making more intelligent decisions."

Because Mathes has felt this awareness, he, personally is in Florida and not Texas or California.

"There's an opportunity here to build patterns of living in new and better ways. All the emerging patterns are here."

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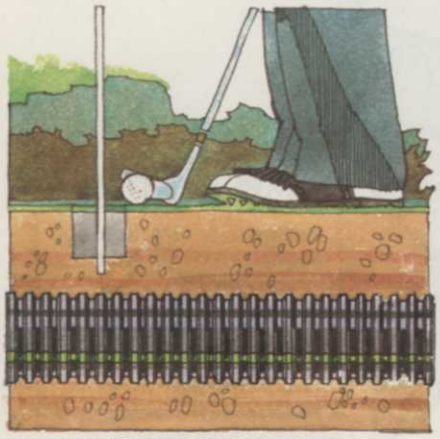

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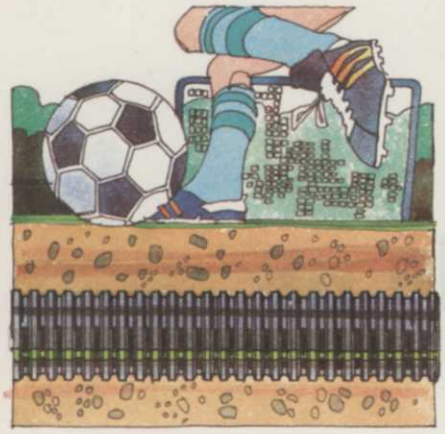

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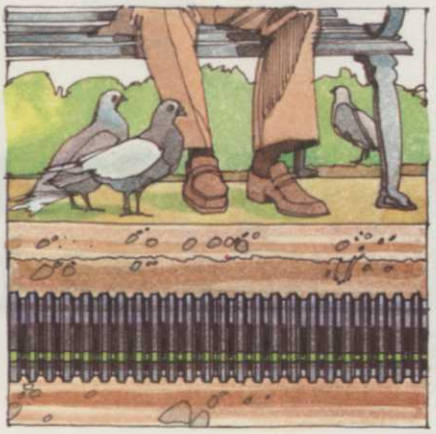

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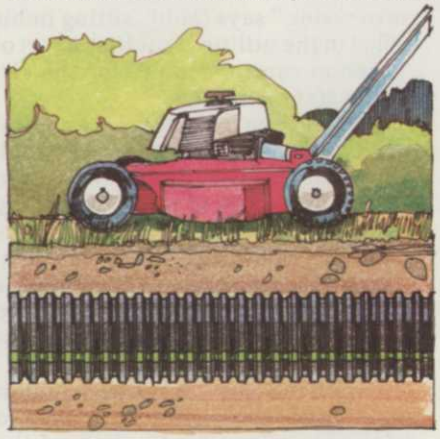

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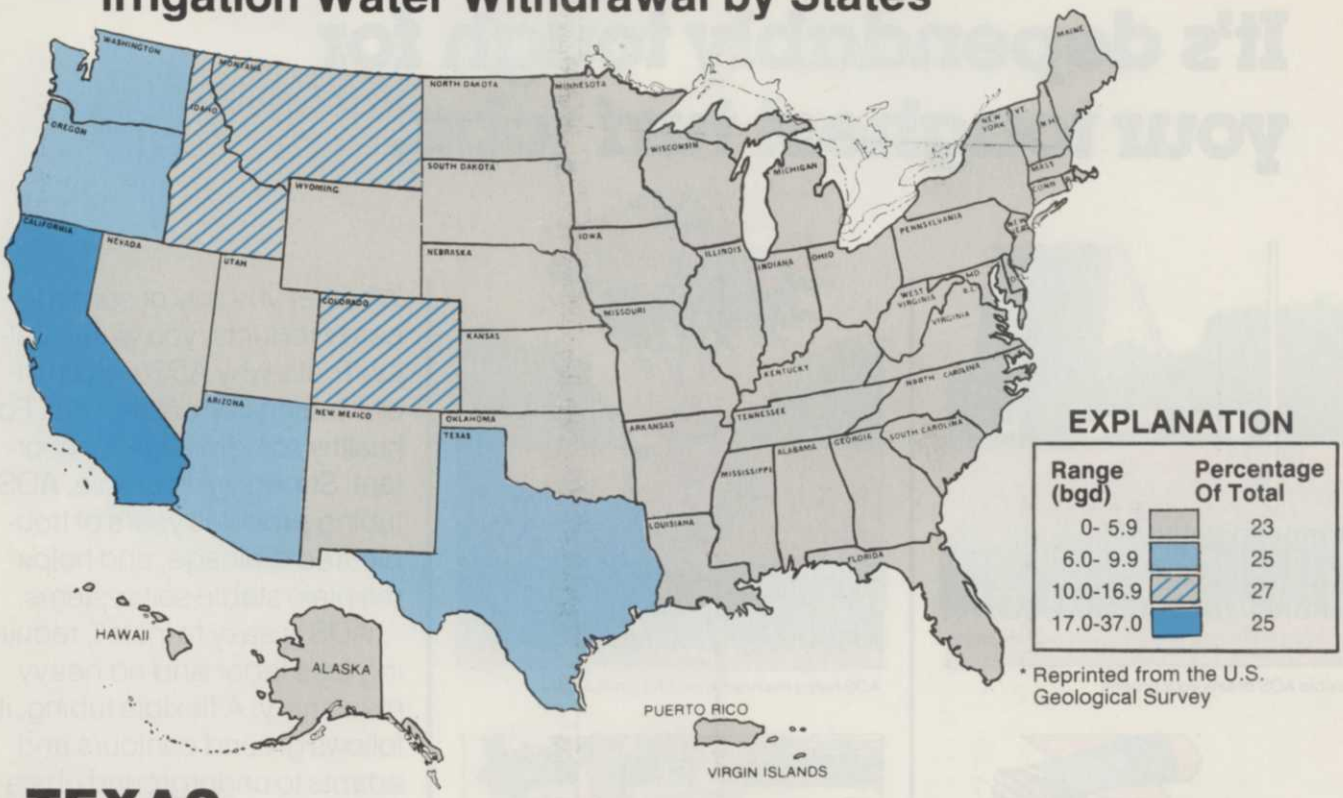
Irrigation Water Withdrawal by States*



* Reprinted from the U.S. Geological Survey

TEXAS

Salt and supply make water problems as big as the state itself

Texas is another Pandora's box of water problems.

More pressing is the issue of having enough water. Some suggestions for bridging that problem have been a little grandiose—such as building a canal from the Mississippi River to the high plains of Texas, or pumping water from Canada to replenish dwindling Texas aquifers. Sodium problems are also at the top of the list, especially in the El Paso, Midland, Odessa and Lubbock areas.

Texas has also had to bear a phenomenal increase in growth over the past 10 years, adding another burden to an overtaxed water supply.

One barometer of that growth is the 18,000-acre Dallas/Ft. Worth Airport, the sixth busiest airport in the world.

Jim Dalby is the utilities service coordinator for DFW airport.

"We're doing everything we can to save water," says Dalby, sitting in his office in the utilities building, a sort of "mission control center" for the airport water operations.

Not far from his office is the central utility plant computer console which keeps tabs on every drop of the nine to 10 million gallons of water used a day by the different functions of the airport. The monster computer terminal can even monitor the depth and flow of the 320-acre-foot Trigg Lake, the airport's major runoff collection reservoir.

"With all the new construction here, we're looking for new ways to impound water with the help of the U.S. Geological Survey," he said.

There are currently five runways with a sixth under construction.

Currently, the Department of Water Resources allows the aiport to impound 108 to 120 million gallons of water. With the increasing water demands, the department is petitioning the DWR to impound more because all the concrete in the airport makes the runoff rate much higher.

The runoff water that is collected in Trigg Lake provides the one million gallons a day need to irrigate Bearcreek Golf Course at the Amfac Hotel at the airport's south end. The north end of the airport is slated to get a lake for impounding, but currently uses potable water for irrigation. That water is supplied from Dallas and Ft. Worth.

Dalby and his associates have also been seriously looking at using effluent from industrial waste.

"The more we can reuse, take from the ground and use from Mother Nature, the cheaper it will be for the cities," Dalby said.

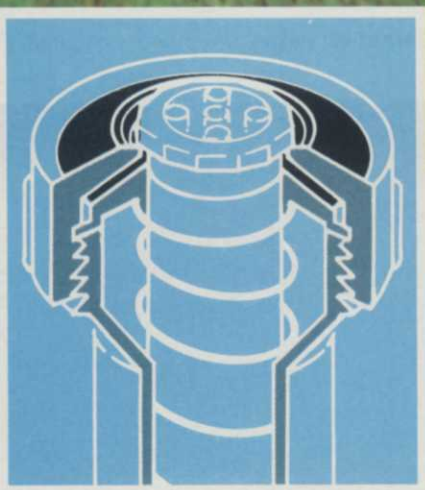
In his 11 years with the airport, Dalby has seen "amazing changes."

continued on page 56

Now Toro's popular 570 Family gives you even greater flexibility

New 570-4P spray head clears taller grasses

With a full 4¼″ pop-up to the nozzle, Toro's new 570-4P spray head effectively clears tall grass and low ground cover, making the 570 Family more versatile than ever. Now you have a full range of pop-up sprinklers: 2″, 3″, 4¼″, 6″ and 12″, plus shrub risers. The new 570-4P has superior, positive retraction, with a stainless steel spring to make sure it pops down completely out of sight when not in use. And it's designed to handle all kinds of water sources, thanks to new, improved seal and minimal self-flushing action. An all-new body design includes Toro's exclusive "Conilip" seal and cap configuration. The screw-on cap makes it repairable from the top of the sprinkler. It accepts all 570 nozzles and filter screens, including Toro's full-range of nozzle angles: 0°, 10° and 35°. Now, more than ever, you'll find the answer is Toro!



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In less than 20 years, turf-type perennial ryegrass has grown from obscurity to become perhaps the most important turf species used in the U.S.

Prior to the mid-1960's, ryegrass was a derogatory term reflecting cheap seed mixtures and poor turf performance. Today, some of the finest turf in America is composed of pure stands of turf-type perennial ryegrass.

The ryegrass revolution began in the mid-1960's when NK100 was developed by Howard Kaerwer of Northrup King. Acceptance was slow to develop, except in Long Island, NY, where Bob Russell of J. L. Adikes found NK100 to be well adapted as a turfgrass. A strong local market developed.

Pelo, a Dutch variety originally bred to be a pasture grass, was found to have improved turf properties and became the second turf-type variety. Work by Kaerwer showed that Pelo and NK100 made an improved combination for southern overseeding. This blend became Medalist 2 and started the winterseeding revolution which has since converted most of the south to perennial ryegrass for use as a fine winter turf, particularly on golf courses.

Next came Manhattan developed by Dr. Reed Funk of Rutgers. Manhattan was the first modern turf-type and represented a giant advancement. The parent material was selected from old turf areas in Central Park, NY in 1964.

Pennfine, developed by Dr. Joe Duich at Penn State, quickly followed and became the first turf-type perennial ryegrass protected under the U.S. Plant Variety Protection Act. Pennfine was a huge and immediate success and has since become the most widely used variety ever developed!

The success of Manhattan and Pennfine led to increased public and private breeding efforts in the U.S. and Europe which quickly led to the development of Derby, Yorktown, Citation, Regal, Omega and Diplomat in the early to mid 1970's. Breeding has continued undiminished since then and has led to the abundance of improved types now available.

In 1983, perhaps 50 million pounds of turf-type perennial ryegrass seed was planted in the U.S.

In northern areas the improved cultivars form a dense, low-growing, fine-leafed perennial turf. When overseeded on dormant Bermudagrass, improved varieties establish rapidly and form a dense, attractive turf during the winter months. In the spring and summmer the renewed growth of the Bermudagrass overwhelms the perennial ryegrass. Each fall the ryegrass must be reseeded.

The rapid establishment and attractive, but tough, turf formed by improved perennial ryegrass cultivars make them an ideal species for athlet-

Landscape Manager's Guide to
Perennial Ryegrasses

by Gerald W. Pepin, Director of Research, Pickseed West Inc., Tangent, OR

ic fields and parks. Many sports fields are now wholly or partly perennial ryegrass.

Although ryegrass is a bunch grass and doesn't spread by stolons or rhizones, it does tiller well and the rapid germination and establishment characteristics of the species make overseeding a very viable solution to bare or worn spots.

Perennial ryegrass mixes well with Kentucky bluegrass. Their similarity in color, texture, and appearance often makes them difficult to distinguish.

Differing resistance to common turf diseases is another big advantage gained by mixing the two species. Perennial ryegrass is rarely damaged by Fusarium blight, stripe smut, and Helminthosporium leaf spot—three of the more serious bluegrass disease problems. Conversely, Kentucky bluegrass is rarely affected by Rhizoctonia brown patch, Pythium blight, and Corticium red thread—three of the more serious ryegrass disease problems.

Improved cultivars are generally winterhardy well into Canada, but also are tolerant of heat and summer stress conditions deep into the transition zone.

Establishment

The rapid germination and establishment characteristics of ryegrass have been the most important factors in their remarkable success. Good quality seed from all ryegrass cultivars appear to germinate quickly into vigorous seedlings that rapidly establish a mowable turf. Under warm soil and air temperatures and adequate moisture, it is possible to mow ryegrass two weeks later.

There appears to be only small differences in the germination and establishment rates of improved cultivars.

Leaf texture and mowing quality

Most of the modern ryegrasses have a pleasing moderately-fine texture and mow cleanly. The older varieties released before Manhattan and Pennfine were characterized by broader, often coarse leaf texture and poor mowing quality, particularly during warm, dry weather. Most of the newer cultivars are characterized by fine to moderately fine leaf texture and mow even more cleanly than Manhattan and Pennfine, particularly during hot dry weather.

Overseeded perennial ryegrass green, *at Inverrary Country Club, Lauderhill, FL, during the winter. Southern winterseeding and northern use of perennial ryegrass consumes more than 50 million pounds of seed per year.*

Growth habit

The low growth habit of improved perennial ryegrasses enables them to persist at very low cutting heights. For the last 15 years breeders have been quite successful in producing a lower-growing, more dwarf type growth habit in perennial ryegrass.

Improved cultivars are generally winterhardy well into Canada, but are also tolerant of heat and summer stress conditions deep into the transition zone.

In many closely-mown golf fairways around the country, improved cultivars are persisting and forming a tough and attractive turf when mown as closely as 1/2- to 3/4-inch.

"Barclay", a Dutch variety, has demonstrated a slight creeping growth habit via prostrate stems that can take root at the stem nodes. Also several selections that "creep" in a similar manner have been found, leaving the possibility that "creeping" perennial ryegrasses are a real possibility in the future.

Color

Most people in the U.S. have a preference for darker green cultivars, such as Citation, Regal, Fiesta, Prelude, etc. Conversely, the preference in Europe is usually for lighter green types, such as Loretta and Elka. Plant breeders now have the genetic resources to produce cultivars ranging from light to very dark green.

Color is much a matter of personal preference so there is no "superior" color. Most agronomists feel that a medium-dark green color that blends well with other cultivars and doesn't contrast sharply with Kentucky bluegrasses is best. Cultivars with a genetically dark color are important to individuals who want a dark green turf with minimum fertilizer usage.

Winter survival

In general, the winter survival of improved turf-type ryegrasses has been very good, and certainly much improved over the older "common" varieties such as "Linn". In the early 1970's there was much concern that turf ryegrasses would be damaged by hard winters in the Northeast, upper mid-West and the Rocky Mountain states. These early fears were largely unfounded. Most of the improved cultivars can form a long lived, perennial, winter hardy turf throughout the U.S. and into Southern Canada. Some cultivars appear to have an extra measure of winter hardiness, including Blazer, Delray, Manhattan and NK200.

Summer survival

Heat and drought tolerance plus resistance to summer turf disease and insect pests appear to be the major factors responsible for improved summer survival of ryegrass cultivars in areas subject to severe summer stress. Many good cultivars are now available that are capable of forming an attractive perennial turf in areas deep in the "transition" zone.

Recent research findings indicate that the presence of a fungus called the Lolium endophyte in certain cultivars is strongly associated with improved summer survival. This exciting new development in ryegrass breeding is discussed in greater detail below.

Some of the turf-type ryegrasses that have demonstrated better than average summer survival in stress areas include Pennant, Citation II, Regal, All*Star, and Repell.

Winter seeding

Every autumn millions of pounds of turf-type perennial ryegrass are overseeded into dormant Bermudagrass turf on golf courses in the southern U.S. Blends of improved varieties can form a beautiful, dark-green temporary turf during the winter months in the south.

On some golf courses only the greens and tees are overseeded. On others the entire course is overseeded with turf perennial ryegrass blends.

Most of the better turf type cultivars are good winterseeding grasses. To obtain better genetic diversity, many seed companies blend together two or more ryegrass cultivars and sell the blend under a brand name. Often perennial ryegrasses are mixed with other turf species such as red fescue and *Poa trivialis*. Some of the more popular and widely used winterseeding formulations are CBS, Futura plus, Marvelgreen, Medalist, and PHD.

Disease resistance

Like all other turfgrasses, the perennial ryegrasses are subject to a

TABLE 1

Characteristics of 34 Perennial Ryegrass Cultivars*

Cultivar	Color	Tiller Density	Leaf Texture	Winter Hardiness	Mowing Quality	Brown Patch Resistance	Brown Blight Resistance	Crown Rust Resistance	Stem Rust Resistance	Red Thread Resistance	Endophyte Level
All Star	7	7	7	7	6	7	7	6	4	6	6
Barry	8	7	7	7	7	7	6	5	3	5	1
Belle	7	7	6	8	6	7	7	6	2	6	1
Birdie	7	6	6	7	6	7	5	7	2	6	1
Birdie II	7	7	7	5	7	7	7	8	8	8	8
Blazer	7	7	7	8	6	7	7	6	4	6	2
Caravelle	9	4	6	3	3	4	5	4	3	6	1
Citation	8	6	7	7	6	7	3	5	2	7	1
Citation II	8	6	7	6	7	7	8	8	8	8	9
Cowboy	7	6	7	5	5	6	7	7	8	7	6
Dasher	7	6	6	8	6	7	6	7	2	7	3
Del Ray	6	7	6	8	7	7	3	7	5	7	3
Derby	7	6	6	6	6	7	6	4	2	7	3
Diplomat	7	6	7	8	5	7	7	4	3	6	1
Elka	5	8	9	8	8	5	5	9	5	6	1
Fiesta	8	6	7	8	7	7	6	7	2	6	2
Game	5	3	3	4	3	2	5	8	3	5	1
Gator	8	8	7	7	8	7	7	8	4	7	1
Linn	5	2	3	3	1	2	4	6	3	5	3**
Loretta	5	7	8	7	8	5	6	8	5	6	1
Manhattan	6	5	6	8	5	5	6	3	3	5	1
Manhattan II	8	8	8	6	8	7	7	7	8	6	2
NK 200	7	5	6	9	4	5	5	3	3	6	1
Omega	7	6	6	8	5	7	7	4	3	7	1
Omega II	7	7	7	7	7	7	7	7	8	7	5
Palmer	7	8	7	6	6	8	7	7	1	7	3
Pennant	7	6	6	8	5	7	6	7	3	7	8
Penn Fine	6	5	6	6	5	7	3	5	3	7	3
Prelude	8	8	6	6	6	7	7	8	2	7	5
Premier	7	7	7	6	6	7	6	7	2	7	5
Regal	8	6	6	8	7	7	7	4	1	7	8**
Repell	7	7	7	7	7	7	6	5	4	6	9
Tara	8	7	7	6	7	7	6	7	4	6	1
Yorktown II	7	7	8	7	7	7	7	5	2	5	1

*9 = Darkest color, most density, finest texture, most winter hardiness, best disease resistance, and highest endophyte level.
** Endophyte level may vary with different seed lots.

number of turf diseases. However, as a species, perennial ryegrass appear to be less subject to severe disease problems than bluegrass, fine fescue, and bentgrass.

The most serious summer disease problem is brownpatch incited by *Rhizoctonia solani*. Other warm weather disease problems include winter Pythium blight or damping off, dollarspot incited by *Sclerotinia homoeocarpa*, and stem rust *Puccinia graminis*.

Some of the more important cool-season diseases include winter brown blight (also called winter leaf spot) incited by *Drechslera* spp. (formerly *Helminthosporium* spp.), crown rust incited by *Puccinia coronata*, and Corticium red threat and pink patch.

Brownpatch is potentially a very serious problem on ryegrass turf during periods of warm humid weather. It is favored by warm night temperatures, high nitrogen fertilization, and supplemental irrigation. Fortunately, great improvements in brownpatch resistance have been made by plant breeders, particularly Dr. Reed Funk at Rutgers University. Good genetic resistance to brownpatch has probably been the single most important factor in extending southward the usage of turf type perennial ryegrass. Some of the more brownpatch resistant cultivars include Blazer, Citation II, Prelude, Palmer, Pennant, and Premier.

Pythium blight or damping off is usually a disease of seedlings or young turf. There is little genetic resistance to Pythium so appropriate fungicides should be used if it is a problem. Applying supplemental irrigation carefully often helps limit the occurance of pythium. During warm weather it is very helpful to plant seed treated with fungicides, such as Koban or Apron. This practice is used extensively for winterseeding in the south.

Incidents of **dollarspot** damage on perennial ryegrass turf appear to be increasing. This disease is often seen in shady areas and is favored by low nitrogen levels, dry soil conditions, high humidity, and moderate temperatures.

Crown rust usually occurs in the fall and though unsightly is generally not a major problem. It is favored by the cooler temperatures of late summer and is usually seen on turf whose growth is slowed by a lack of adequate fertility or drought stress. It is seldom found on actively growing turf. Some of the more crown rust resistant cultivars include Elka, Loretta, Gator, Prelude, Premier, and Fiesta.

Brown blight, or winter leaf spot, is usually associated with cool temperatures and wet or water saturated turf. It is frequently seen in the cooler parts of the year and under short day lengths when turf is growing very slowly.

This disease is a serious problem on winter turf in the Pacific Northwest. Fortunately, many of the newer cultivars have good resistance to winter brown blight. Some of the most resistant cultivars include Prelude, Citation II, Blazer, and Manhattan II.

Corticium red thread is becoming an increasingly important turf disease. It appears to be several diseases and plant pathologists now distinguish at least two closely related forms, red thread and pink patch. Red thread and pink patch can be serious problems on turf maintained at low to medium fertilizer levels. It is also favored by cool cloudy weather. Most presently available cultivars have varying degrees of susceptibility. There appears to be some genetic resistance to Corticium and resistant cultivars may be available in the coming years.

Insect resistance and Lolium endophyte

One of the most recent developments in ryegrass breeding has been the release of several cultivars resistant to damage incited by insects such as sod webworms and billbugs.

Just recently, it has been determined that the insect resistance is apparently related to the presence of a fungal endophyte living within the

continued on page 41

Another winner from Barenbrug's stable

If you want to be sure of a perfect variety of turf-type Perennial ryegrass, include Barry in your program.

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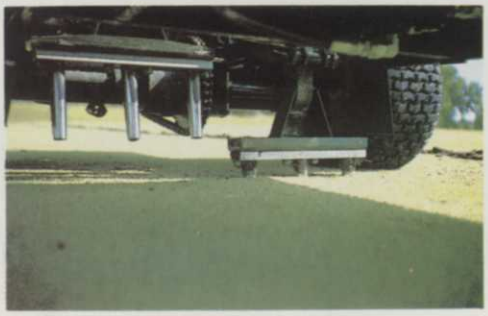
decreases surface runoff and irrigation frequency. It also breaks up thatch and compaction and brings up soil particles to reinoculate thatch with soil and microbes to enhance thatch decomposition. The Ride-Aire breaths new life into thick lawns and helps prevent the "5-year slump" in turf quality that causes customer dissatisfaction and turn-over. Whether regular turf maintenance or renovation, the new Ride-Aire adds a new dimension to the lawn care service industry.



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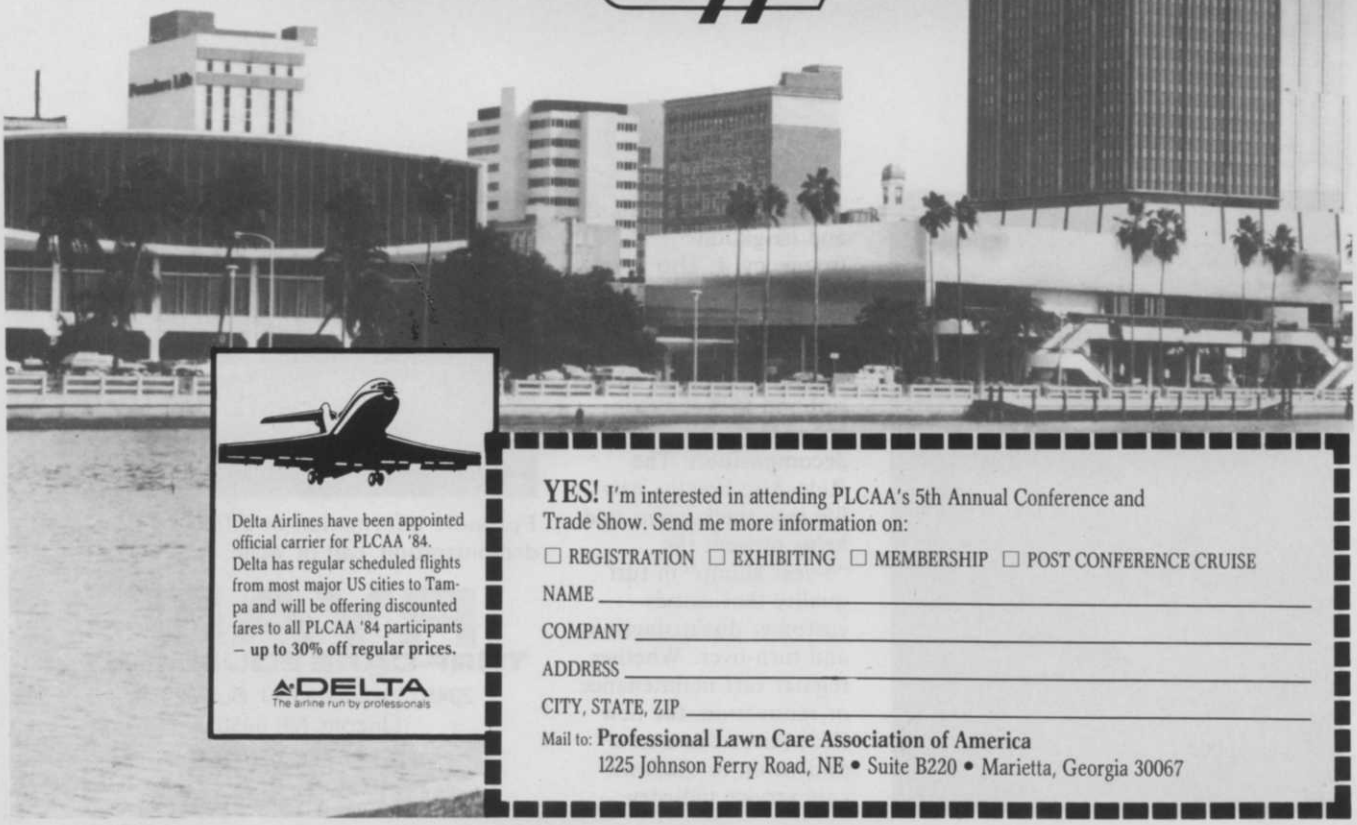

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plant. This Lolium endophyte lives symbiotically within the host plant and causes no outward symptoms when present.

The mechanism of resistance is not clear, the best theory is that the fungus produces a chemical within the plant that is toxic to chewing insects. The endophyte is transmitted by seed or by vegetative propagation such as tillering. It does not spread from plant to plant in the field.

Under "average" storage conditions the fungus will remain viable in seed from 8 to 16 months after harvest. Under cool storage (40 degrees F.) the endophyte will remain viable for many years.

One of the most recent developments has been the release of several cultivars resistant to damage by insects.

Plants grown from seed possessing living Lolium endophyte will have the endophyte growing within the plant and concentrated mainly in the lower stem and crown. Ryegrass plants with the endophyte have demonstrated resistance to damage caused by chewing insects such as the sod webworm (*Crambus* spp.), billbug (*Sphenophorus parvulus*) and Argentine stem weevil (*Listronotus bonariensis*).

Endophyte enhanced performance

In addition to improved insect resistance, ryegrass plants possessing the Lolium endophyte often exhibit improved turf performance—particularly during periods of summer stress due to heat and drought.

For reasons that are not clear, endophyte infected turf appears to have improved persistance and vigor during periods of summer stress. It may also have increased vigor, a more attractive appearance, improved density and recover more rapidly from injury.

During most of the year good varieties not containing endophyte will be every bit as good as those that do. It is only during periods of chewing insect infestation or summer stress that an endophyte containing cultivar may

Perennial Ryegrass Varieties

All Star is a leafy, attractive, medium early, turf-type variety. It is marketed by J. and L. Adikes of Jamaica, NY. Most of the parental germplasm of All*Star originated from selections made from old turfs located in Baltimore and College Park, MD. All*Star has the ability to produce a fine, dense turf with a reduced rate of vertical leaf growth and an attractive bright, dark green color. The variety has shown good heat and drought tolerance and good cold hardiness. All*Star has demonstrated good resistance to Rhizoctonia brown patch disease and some species of sod webworm.

Barry is a leafy, attractive, late maturing turf-type variety, developed in Europe by Barenbrug Holland BV, and marketed in the U.S. by Turf Merchants Inc., Albany, OR. Its parental germplasm came from Manhattan and from selections made in Europe. Barry is capable of producing a fine textured, dense, medium-low growing turf with a dark qreen color. It has good resistance to brown blight and Rhizoctonia brown patch. Barry has good heat and cold tolerance and the ability to maintain good color into the cool temperatures of late fall. Mowing characteristics are above average.

Belle is a medium early maturing variety currently being produced by E. F. Burlingham and Sons of Forest Grove, OR. Belle is a leafy, persistant, turf-type variety capable of producing an attractive, dense, moderately low-qrowing, fine-textured turf of a moderately dark green color. Belle has shown moderately good resistance to some races of crown rust, Rhizoctonia brown patch and winter brown blight diseases. It has shown medium to good heat and cold tolerance, good wear and good mowing qualities.

Birdie is a medium early variety developed by Turf Seed, Inc. of Hubbard, OR. It has a moderately dark green color, medium-fine texture, medium-high density, and is a moderately low-growing, turf-type variety. Birdie has moderately good resistance to Rhizoctonia brown patch and some races of dollar spot. It is susceptible to the winter brown blight disease. Birdie has shown medium-good heat tolerance and medium cold hardiness. It has relatively good mowing qualities except during late spring when the turf becomes quite stemmy.

Birdie II is an early maturing variety developed by Pure-Seed Testing and marketed by Turf Seed Inc., Hubbard, OR. This variety was derived from Birdie perennial ryegrass and new sources of stem rust resistance. It produces a leafy, persistent turf with a medium dark blue-green color and good density. Birdie II has excellent seedling vigor, and improved resistance to winter brown blight, brown patch, stem rust, and heat tolerance, and a dwarfer growth habit than its parent Birdie. This variety has moderately good resistance to insects such as bill bugs and sod webworm based on its high endophyte level (81 percent). It has performed very well for the overseeding of dormant bermudaqrass in the southern U.S.

Blazer is a medium late maturing variety currently being produced by Pickseed West Inc., of Tangent, OR. Blazer is a leafy, persistent, moderately low-growing turf-type perennial ryegrass capable of producing an attractive, dense, fine-textured turf of a bright, moderately dark green color. Blazer has shown good resistance to Rhizoctonia brown patch and winter brown blight and moderate resistance to some races of crown rust. It has demonstrated good heat and cold tolerance and has good mowing qualities.

Caravelle is a medium maturing variety developed in the Netherlands by Mommersteegs International and distributed in the United States by O. M. Scott and Sons of Marysville, OH. Caravelle is a leafy, low-growing, turf-type variety with a very dark green color, medium fine texture and medium density. It has medium-poor cold hardiness and poor heat tolerance. Caravelle is susceptible to the Rhizoctonia brown patch disease. This variety is used primarily for winter overseeding in the South. It tends to mow poorly in hot, dry weather.

Citation is an early maturing variety with an attractive, bright, dark green color. It was developed, and is being produced and marketed by Turf Seed Inc. of Hubbard, OR. Citation produces a low-growing turf with medium fine texture and medium density. The variety has medium cold hardiness, good heat and wear tolerance and good resistance to Rhizoctonia brown patch and Fusarium blight. Citation has moderate resistance to red thread and many races of dollar spot. It is susceptible to the winter brown blight disease. Citation has good mowing qualities except during its reproductive phase in late spring.

Citation II is a medium-early maturing variety capable of producing a fine textured turf of medium high density. Citation II has the rich dark blue-green color and heat tolerance of its parent Citation. This variety, marketed by Turf Seed Inc. was developed cooperatively by Pure Seed Testing Inc. and the New Jersey Agriculture Experiment Station. It has shown very good resistance to brown patch, stem rust, winter brown blight, dollar spot and crown rust. Citation II has also shown improvements in its tolerance to red thread and *Fusarium nivale*. This variety has excellent seedling vigor, heat and cold tolerance, close mowing tolerance, improved mowing quality and a low growing, dwarfer leaf orientation. The endophyte of this variety is very high at 94 percent, which should convey resistance to above ground feeding insects. It has performed very well in southern overseeding trials.

Cowboy is a new, very early maturing variety being marketed by Loft's Seed Co., Bound Brook, NJ. It was developed as a new stem rust resistant variety cooperatively by the New Jersey Agriculture Experiment Station and Pure Seed Testing Inc. This variety has a moderately dark green color, a medium fine texture and medium density. It has a low growth habit compared to other early maturing varieties. It has

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shown good resistance to winter brown blight, brown patch, crown rust, and dollar spot. It has good heat and cold tolerance and will be very good for the overseeding of dormant bermudagrass in the southern U.S. It has a moderately high endophyte content (57 percent) which should convey a moderately good level of insect resistance.

Dasher is a medium early variety developed by Pickseed West Inc. of Tangent, OR. It is a fine-textured turf-type variety capable of producing a leafy, dense, attractive moderately low-growing, persistent turf with a bright, medium dark green color. Dasher has show good resistance to winter brown blight. It has medium good cold hardiness and good heat tolerance. Dasher has relatively good mowing qualities except during the reproductive period in late spring.

Delray is an early maturing variety that was developed and is being produced by Northrup King. It has a medium dark green moderately low-growing, turf-type variety. Delray has moderate resistance to Rhizoctonia brown patch and some races of dollar spot. It appears to be highly susceptible to the winter brown blight disease. Delray was developed for improved winter hardiness and improved performance at reduced fertility levels. It appears to have moderately good heat tolerance. It has moderately good mowing qualities except during its stemmy, reproductive period in late spring.

Derby is an early maturing variety developed by International Seeds Inc., of Halsey, OR. It has been a very popular variety for the last 10 years. It is a moderately fine-textured, turf-type variety capable of producing an attractive turf of medium density and a moderately dark green color. Derby has medium cold hardiness, good heat tolerance and good wear tolerance. The variety is susceptible to the winter brown blight disease but shows moderately good resistance to Rhizoctonia brown patch and some races of dollar spot. Leaf appearance is moderately good after mowing except during late spring.

Diplomat is a medium late maturing variety developed by Lofts Seed of Bound Brook, NJ. It is an attractive, moderately dark green, turf-type cultivar that produces a leafy, persistent turf of greater density, finer texture, and a slower rate of vertical growth than most other perennial ryegrasses. It has moderately good resistance to Rhizoctonia brown patch and the winter brown blight disease. Diplomat has good heat and cold tolerance and relatively good mowing qualities.

Elka is a late maturing variety developed in the Netherlands by Cebeco-Hendelsraad. International Seeds is currently producing seed of this variety. Elka is a turf-type variety with a medium light green color. It has soft, fine leaves and the ability to produce a turf with greater density and a slower shoot growth rate than most varieties currently on the market. It has fair heat tolerance and moderately good cold hardiness and shade adaption. Elka has demonstrated good resistance to present races of crown rust but the variety appears moderately susceptible to Rhizoctonia brown patch, winter brown blight and dollar spot. Mid-spring performance ratings of Elka can be excellent but summer performance can be below average.

Fiesta is a medium early maturing variety currently being produced by Pickseed West Inc., of Tangent, OR. Since its release in 1977, Fiesta has been a popular and widely used variety. It has a moderately dark green color, medium fine texture, and medium high density. It has a reduced shoot growth rate and a turf-type growth habit. Fiesta has good cold hardiness and good heat tolerance. The variety has good resistance to Rhizoctonia brown patch and moderate resistance to winter brown blight.

Game is an early maturing variety developed in the Netherlands. Game has a bright, medium green color, low density and prduces a turf with an erect growth habit and a rapid shoot growth rate. Game has shown poor heat and cold tolerance and high susceptibility to Rhizoctonia brown patch. It has a very poor leaf appearance after mowing.

Gator was develped by International Seeds Inc., Halsey, OR, from germplasm obtained from the New Jersey Agricultural Experiment Station. It is a leafy, turf-type ryegrass of

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Tank Capacity	2.6 gals.	3.9 gals.	5.2 gals.
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medium maturity. Gator is a newer Variety and is capable of producing an attractive, persistant, low-growing, fine textured turf of medium high density and has a bright medium dark green color. It has shown good resistance to Rhizoctonia brown patch and winter brown blight. It has very good resistance to many races of crown rust. Gator has demonstrated good winter hardiness and improved summer performance. It has beter mowing qualities than most other varieties now available and can tolerate low cutting heights well. Gator is very low in percent endophyte content.

Linn is an early maturing variety with a bright, medium green color, low density, an erect growth habit and a very rapid vertical growth rate. It has poor heat and cold hardiness and poor wear tolerance. Linn is susceptible to the Rhizoctonia brown patch and winter brown blight diseases. It has very poor mowing qualities.

Loretta is a late maturing variety developed in Germany. It is distributed in the United States by O. M. Scott and Sons of Marysville, OH. Loretta is a leafy, moderately low-growing variety with soft leaves and a turf-type growth habit. It has a bright medium light green color, medium fine texture and medium high density. Loretta has medium heat and cold hardiness. The variety has good resistance to present races of crown rust, moderate resistance to Rhizoctonia brown patch and winter blight and is quite susceptible to dollar spot. Loretta exhibits a good leaf appearance after mowing.

Manhattan is a late maturing variety developed by the New Jersey Agricultural Experient Station. Manhattan is a leafy, moderately low-growing, turf-type variety with a bright, moderately dark green color, a medium fine texture and medium density. Manhattan has moderately good tolerance of heat and shade, improved cold hardiness and excellent wear tolerance when growing conditions are favorable. Manhattan has good resistance to the winter brown blight disease and moderate resistance to Rhizoctonia brown patch. It is moderately susceptible to crown rust, red thread and dollar spot. This variety shows relatively good mowing quality during heat stress.

Manhattan II is a leafy, attractive, persistent, turf-type variety of medium maturity. It was developed cooperatively by Pure Seed Testing Inc., the Manhattan Ryegrass Growers Association, and the New Jersey Agricultural Experiment Station. It is capable of producing a dense, fine textured, medium low growing turf with a bright, dark green color. Compared to Manhattan, Manhattan II shows improvements in resistance to stem rust, brown blight, Rhizoctonia brown patch and red thread. It also shows improvements in heat tolerance, summer performance and mowing qualities.

NK200 was developed by the Northrup King Company. It is a late maturing variety with a bright, medium dark green color, medium texture and a turf-type growth habit. NK200 has improved cold hardiness but below average heat tolerance. It is susceptible to crown rust and Rhizoctonia brown patch. NK200 has good mowing qualities except during heat stress.

Omega is a medium maturing variety developed by Turf Seed Inc. of Hubbard, OR. It has a bright, type habit, a medium high density and a reduced rate of vertical shoot elongation. It has good heat, cold and wear tolerance. Omega has good resistance to the Rhizoctonia brown patch and the winter brown blight diseases. The variety shows relative good leaf appearance after mowing.

Omega II is a medium early variety being marketed by Turf Seed Inc. It was developed by Pure Seed Testing Inc. with the cooperation of the New Jersey Agricultural Experiment Station. This variety has excellent rust resistance. It has a dark green color and produces a dense, leafy, attractive turf. It has a dwarfer leaf orientation than most other varieties. Omega II has shown excellent brown blight resistance and improvements in heat tolerance, mowing qualities, brown patch, red thread, dollar spot and crown rust resistance compared to its parent, Omega. It possesses comparable seedling vigor and cold tolerance to Omega. This variety contains an endophyte level of 55 percent, to convey a moderately good level of resistance to above ground feeding insects. It has shown good performance in southern overseeding trials.

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Circle No. 121 on Reader Inquiry Card

Winterseeding

The Greening of Inverrary

by Brad G. Kocher, Golf Course Superintendent, Inverrary Country Club, Club Corp. of America, Lauderhill, FL.

Each year hundreds of Southern courses literally apply millions of pounds of "overseeding" grasses to their Bermudagrass greens and tees.

The process of applying the seed takes place normally in October and November and is quite detailed. Exact procedures vary from course to course. At Inverrary, our overseeding program begins long before temperatures cool in the fall.

A successful overseeding is the product of a lot of prior planning and effective turf management. We try to strive for (1) a healthy turf, prior to seeding; (2) a good seedbed; (3) consistent seed application; (4) adequate irrigation; and (5) proper post-germination mowing, watering and fertilizing practices.

Healthy turf is paramount to any quality putting surface. Our pre-seeding goals are to have healthy turf, while not overly lush. Lush turf causes Bermudagrass to grow more rapidly and compete with the newly establishing overseeded grass.

The turf should also be weed-free, fungus-free and void of insects. At no time do we wish to have an outbreak of disease or insects in conjunction with newly established grasses.

A good seedbed is also quite important. This involves minimizing thatch and application of topdressing material after seeding to assure seed/soil contact.

An even application of seed is also imperative to produce a consistent overseeded surface. Our rate is 30 lbs. of ryegrass per 1,000 square feet. We want each green to have the same exact rate, not 28 lbs/1,000 on some greens and 32 lbs/1,000 on others. Golfers may or may not notice the difference. However, the green with more seed may putt slower.

After seed application, the single most important program is proper irrigation. Light, frequent irrigation is the key to a high percentage of seed germination and retention.

Golfers are inconvenienced by the frequent daytime watering and it places more pressure on the irrigation crew. But, the temporary inconvenience is justified by the condition of the overseeded areas during the next six to seven months. In many areas, overseeded turf predominates for a longer period than Bermudagrass.

Lastly, a good overseeding program requires proper turf management—mowing, watering and fertilizing — throughout the winter months. This is outlined in the following chronolog of overseeding at Inverrary.

Overseeding diary

Our overseeding program begins with **verticutting** the greens ten days to two weeks prior to overseeding. The purpose is to thin the Bermudagrass sufficiently and to give it time to heal before applying ryegrass seed. We have found if we verticut the day of seeding, an excessive amount of seed works its way into the verticut grooves and the seed germinates in rows.

Three days before seeding, we **discontinue mowing** the greens. The reason for this is to give the seed some upright Bermudagrass leaf surface for shelter. The seed is not as exposed and the leaf blades stabilize the seed among the Bermudagrass plants. This is particularly helpful if we have a downpour between seeding and germination. The seed is much less likely to wash away.

The day of seeding two crewmembers **remove the dew** from the greens by dragging hoses across them. This speeds up the time it takes for the greens to dry. The greens must be dry so the seed is not tracked off the greens on the shoes of the seeding crew.

Next, the **greens are spiked** in four directions to allow the seed to make better contact with the soil.

Seeding takes the most thought. I like to think we get better each year. Hopefully, the days of spilling seed out the back of a Cushman as we travel from green to green are over.

Each **green is measured** accurately. We know precisely how much seed we need for each particular green to achieve the 30 lbs/1,000 rate. For example, a 6,000-square-foot green should receive 180 lbs of seed (6 x 30 lbs).

In addition, we overseed the perimeter of the green, the cleanup ring, at 35 lbs/1,000. We seed the cleanup ring at a slightly higher rate because of the higher mortality rate of ryegrass in this area due to triplex greens mowing. The extra seed in the area is only noticeable for the first few weeks.

In the past we tried to establish seed rates based upon the speed of the spreader operator. Due to inconsistencies, we now premeasure the amount of seed needed for each green based upon individual measurements.

Using a rotary spreader, set wide open, we **spread seed** in four directions at a normal walking pace. Any leftover seed is then applied at a faster walking pace.

The cleanup passes are made with a drop spreader to give a neat, definitive edge to the green.

Neatness is of monumental importance when applying seed. All of our bags of seed are placed on a

piece of carpet on the collar of the green. One man carries the seed to the spreader and two people apply it, one with the rotary and one with the drop spreader. They switch jobs periodically to avoid boredom.

Before the "seeders" leave the green, they clean their shoes using a brush or small broom. In this way they insure that no seed leaves the green on the bottom of their feet. A small piece of carpet is taken from green to green to provide an area for cleaning.

Next we **apply topdressing** at a rate of approximately one and one-half cubic yards per 5,000 square feet. We use a 90(sand)/10(organic) grade of topdressing. The topdressing helps cover the seed and also provides a medium for good seed-to-soil contact.

Again, neatness is of utmost importance. The topdresser applies his material in a circular motion and never leaves the putting surface until he is finished. This is possible because we back our trucks onto a sheet of plywood at the edge of the putting surface. We can then back the topdresser to the tailgate of the truck and reload it without leaving the green.

When the topdresser leaves he drives onto a sheet of black plastic, cleans the seed off the tires, then proceeds to the next green.

After giving the topdressing material time to dry, we begin **dragging** it in. We use a golf car to pull the mat because it is light and has shallow grooves in the tires making it easy to clean.

We use a steel drag mat with a piece of thick pile carpet attached to one side. We find using the carpet allows us to drag in the topdressing without shifting the position of the grass seed.

Our dragging pattern starts at the outside edge proceding to a series of shifting oval patterns. In this way, we minimize short turns and avoid going over the same area several times causing a buildup of topdressing in one spot. The natural tendency is to keep going over and over the outside edge.

Once dragging is complete, the car is driven off the green onto a sheet of black plastic and the tires are brushed free of grass seed.

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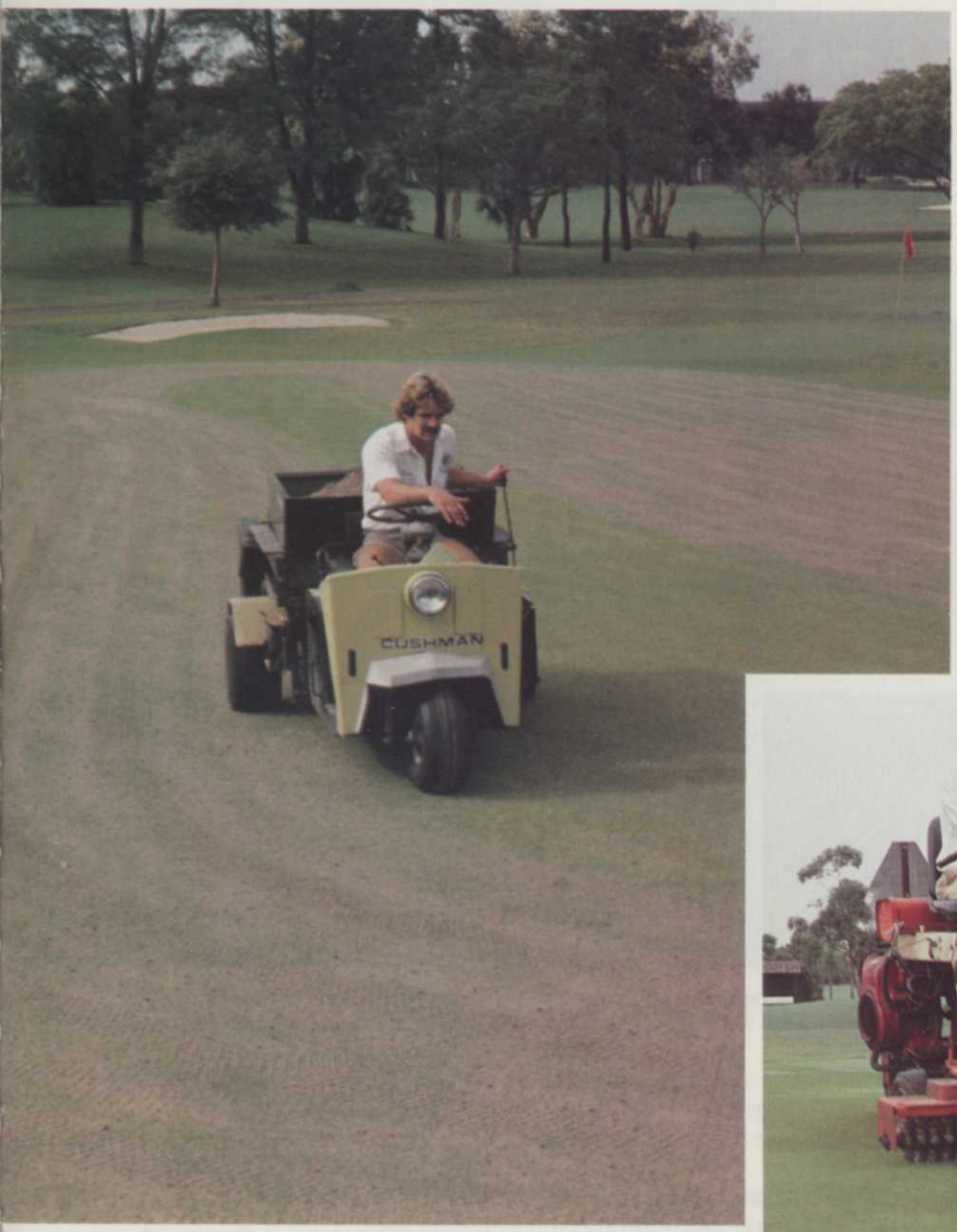

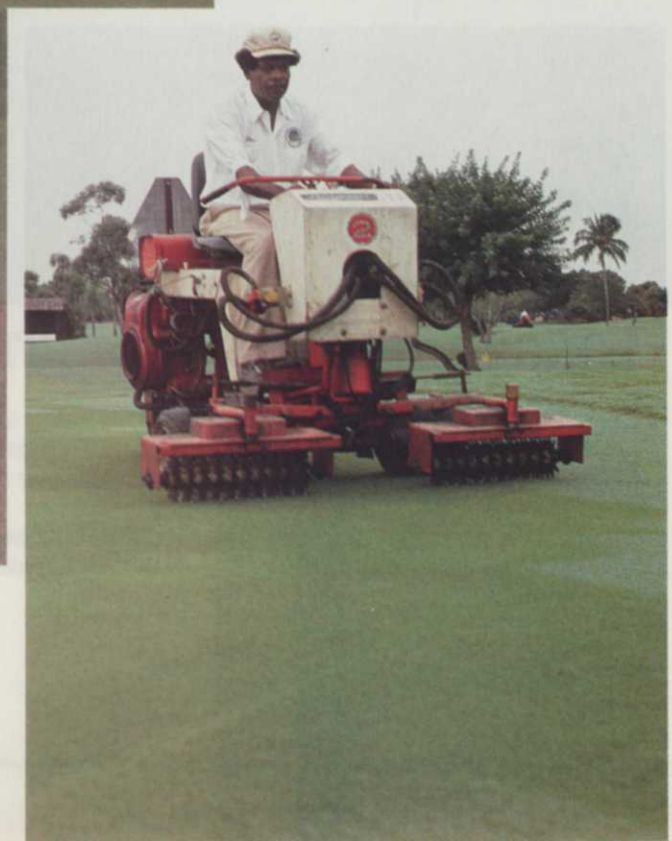

Topdressing *right after seeding and when mowing height is reduced to 1/4-inch is part of a successful overseeding program. Shown right are* **greens spiked** *in four directions prior to seeding to improve seed/soil contact.*

Photos by Jim DeFillippis.

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WINTERSEEDING *from page 49*

Immediately after dragging **irrigation** is applied, thoroughly but not to the point of puddling. The greens should then be watered three to four times lightly during daylight hours. If the weather is exceptionally dry, we have irrigated lightly at 1 a.m. By light, I mean one rotation of the sprinkler head, or just enough to keep the seed moist without overwatering the green.

The seed generally germinates within four days since temperatures are still in the low 80's. Within 24 hours of germination, we apply a preventative **application of fungicide** (Subdue) to thwart any outbreaks of Pythium during the next week. We are not generally subject to Pythium at this time of year. However, a little preventative application insures a good night's sleep for me and the seed.

The **first mowing** is made two days after germination at 3/8-in. We leave the baskets off the mower for the first two mowing. Sharp blades are important to minimize pulling the young ryegrass so mowers are lapped daily.

The greens are mowed daily at 3/8-in. for the next five days, 5/16-in. for the next five days, and 1/4-inch for the next two to three weeks. By now the plants are starting to tiller. Finally, the height is reduced 1/16-in. per week for three weeks for a final height of 5/32-in. is reached. This height will vary depending on the severity of our winter temperatures, but we can obtain a good putting surface at this height.

Light topdressing begins at the same time we lower the mowers below 1/4-in. This light topdressing is applied every three to four weeks to produce a smooth putting surface and to encourage lateral growth by the ryegrass and the slower growing Bermudagrass.

We **fertilize** greens at 3/4- to one-pound of nitrogen per month during January through April, then we change our program to slowly phase out the ryegrass and encourage growth of the Bermuda grass.

No overseeding program would be complete without a description of the **transition from ryegrass to Bermuda**. It can be gradual and hardly noticeable, to quick and disastrous. We have discovered it is best to control transition than let nature take its course and possibly lose the greens on a hot, muggy, windy weekend before a big tournament.

To control transition we start verticutting lightly in April and May and increase fertilizer to one-and-one-half-lbs. nitrogen per 1,000 square feet per month. In this manner we control when and how much ryegrass we take out. We feel more comfortable knowing the ryegrass leaves in relation to our cultural practices, instead of Mother Nature.

Finally, I would like to thank the Inverrary crew who always do that little extra when it comes time to overseed our greens. **WT&T**

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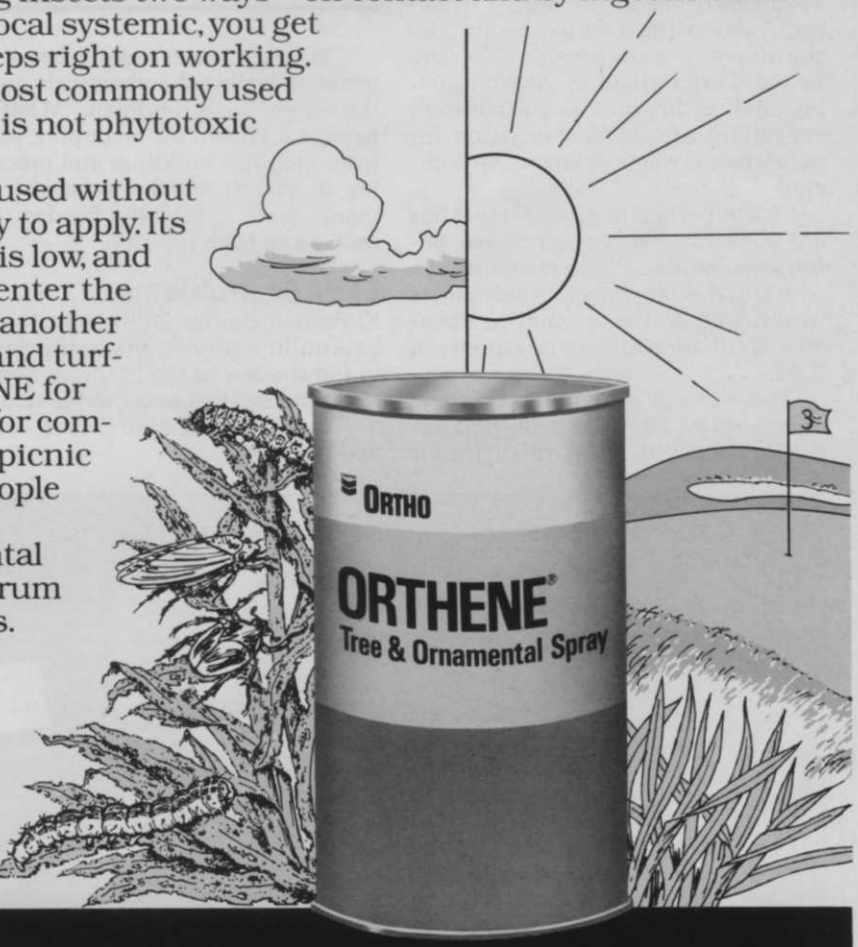

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WATER *from page 32*

Wheat from chaff

Texas has one of the most advanced irrigation licensing laws of its kind in the country.

In 1973, the law, a joint effort of the Texas Turf Irrigation Association and the Texas Board of Landscape Irrigators and under the Department of Water Resources, went into effect. It deals solely with landscape irrigation, and according to Charles Putnam, president-elect of the Irrigation Association, protects the consumer *and* supply of potable water.

Part of the licensing procedure involves taking a test; part of the test is designing an irrigation system which is graded. The licensing board is aware of water conserving aspects and looks for them on the systems being graded.

Putnam reports that about half of the 900 who take the test a year, pass.

John Heidman, president of Irri-Tech Corp., one of the largest irrigation consulting companies in the country and past president of the Texas Turf Irrigation Association, says half of his fees as an irrigation consultant are in compensation for suggesting a water source for his clients.

"It's important to get water that has not gone through an expensive purification process," said Heidman.

With that in mind, Heidman is working on getting a grant to document a situation he sees repeatedly in Dallas.

There is a 26-story office building in downtown Dallas, one of the hundreds of monolithic goliath's vying for the city's water and energy supplies. It uses 100,000 gallons of water per day for its 2,600 tons of air conditioning. Evaporation takes 60,000 gallons. The other 40,000 gallons, because it has gone through the air-conditioning system, has been chemically treated and not suitable for reintegration into the city water supply.

And then there's the wind. It blows so hard at times, it kicks up enough dust to cause motorists to drive with their lights on in the middle of the day, just to get through the mirky brown/red shroud.

"The city water supply bears the brunt of getting the chemicals out of the water," says Heidman. "What we need is a system for recouping water from high rise buildings and processing it, say, at smaller sewage treatment plants to take the burden, and cost, away from the city."

El Paso problems

El Paso, a southwest Texas city of a half million people, sits in the desert in the shadow of the Franklin Mountains and on the border of Mexico.

Two problems haunt El Paso — salt and the wind.

Eighty percent of the city's water comes from underground aquifers, the other 20 percent from the Rio Grande River. Aquifer recharge is slow because of the high demands put on them. The salinity content of the water is 1/2 that of seawater. Municipal water contains the least, 400 parts per million.

In the summer, 2.8 times more water is used than in the winter. As the water is used up, lower quality water is left. The annual precipitation rate is only seven inches.

And then there's the wind.

It blows so hard at times it kicks up enough dust to cause motorists to drive with their lights on in the middle of the day just to get through the mirky brown/red shroud. It also boosts the evaporation rate up to as much as two inches a week and erodes soil.

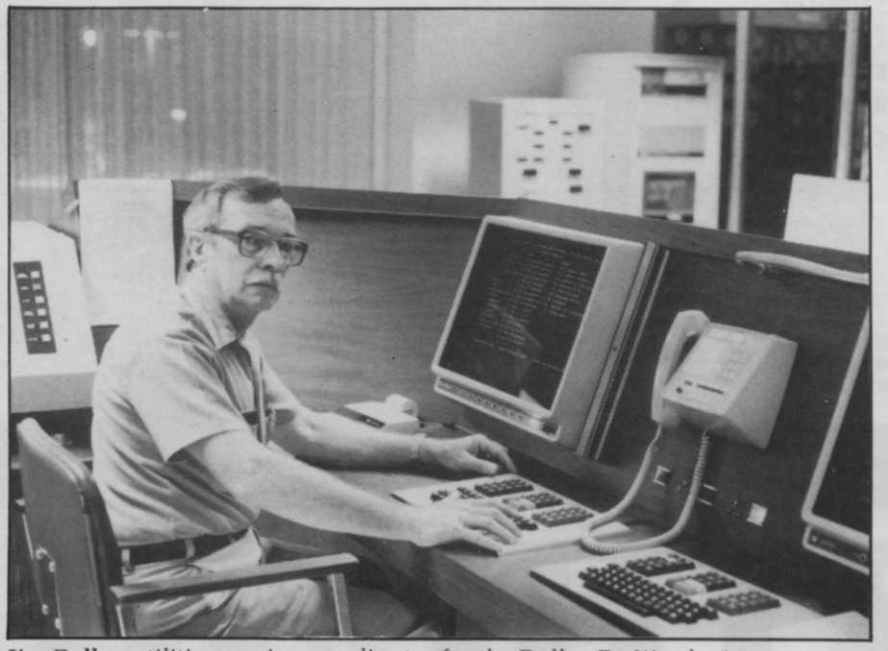
The city, though, if nature cooperates, is getting by. The Water Utilities Public Service Board is also trying to ensure its water supply.

Hugh Hickerson, general manager of the WUPSB, said the city is involved in litigation with New Mexico to try to get more groundwater from that state.

"They (New Mexico) have seven to 10 times the amount of good water El Paso has," Hickerson explained, "but because of a New Mexico state statute, we cannot use any."

The board is also building a $30 million purification plant that, according to Hickerson, will get effluent to "drinking water quality." By the time the plant is completed in early 1985, the residents of El Paso will be drinking treated sewage water.

The Water Utilities Board has also instituted a program among homeowners for using low-water use, native plant materials. Currently 15,000 single family homes are using this type of plant material.



Jim Dalby, *utilities service coordinator for the Dallas-Ft. Worth airport.*

Desalting an institution

Pat Berger has another type of problem—sodium; not on his lawn, but on the 79-year-old El Paso Country Club.

Rings of salt left from well water dot areas of the course and deposit themselves on the sides of creek beds. The 31-year-old superintendent has his hands full with the 120-acre course. He taps his foot with nervous energy against his metal desk in the maintenance office as he talks about beginning a $1.2 million renovation program, scheduled to be completed in 1986 or '87.

A unique situation

Having worked in Arkansas and New York, Berger characterizes the El Paso area as, "like no other place I've been.

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What doesn't get watered here doesn't grow."

"Our temperatures can fluctuate 40 degrees between evening and morning," he says. "But sodium is our biggest problem."

There's also a heavy amount of calcium build-up effecting the rate of change of the soil's Ph factor, according to Berger. The Ph range is high (8 to 9).

Berger has a systematic plan for the renovation which includes getting the grass developed first — greens, tees and fairways. His course is predominantly bermudagrass with bentgrass greens.

Another priority is installing a new, $650,000 irrigation system which will pump 781,000 gallons a night. His water supply is stored in four storage lakes.

"We waste no energy getting water," he said. "We pump right into the system.

Currently, Berger has a quick-coupler system with water supplied from the Rio Grande and the city water sys-

Salt deposited *along the sides of a trench at El Paso Country Club.*

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tem. The club's water allocation from the Rio Grande lasts about seven months. It is quality water, but some weed seeds do filter in. The sodium, level, however, is acceptable. In the winter, he uses well water which contains more salt. The Rio Grande supply depends on the Colorado and New Mexico snowpack melt.

"If Mother Nature is good to us, we get a bountiful supply."

Berger said his present irrigation system is more like a homeowner system. "Our new one will be solid state," he explained, "It will eliminate 90 percent of our current irrigation problems."

Another 20-acre foot lake will be built to increase storage capacity because water is not always available when you may need it. It is being built close to the pump house to be more energy efficient. Another lake will be doubled in size. Berger plans on taking out half of some large cottonwood trees planted by one of his predecessors along one of the lake's edge.

"We'll save about 250 gallons of water per tree. The golfers will still have a canopy and I'll be able to develop specimen trees and get the added water benefit."

There's not much Berger can do about eliminating the wind.

"From mid-February to mid-May we have very windy weather. We built three greens in-house and the first day we seeded, we had 70 mph Santa Ana winds. It was terrible."

With the wind, as much as 1/32nd of the soil surface can be lost.

Because of the wind, Berger said having a more natural golf course to save water needed by trees and turf is impossible.

"The sand blowing would cause golfers to have to wear goggles," he claims."It would become an unplayable situation." **WT&T**

Next month: Part II—Thirsting for Answers...the Solutions. The water situation can be turned around with increased research into low water use turfgrasses and ornamentals, Green Industry Association involvement annd more efficient equipment from irrigation companies. Next month, WEEDS TREES & TURF will explore those areas in the second and final part of "Thirsting for Answers."

(Editor's note: Special thanks to Ed Portmann, Portmann Communications, Inc., Irvine, CA; Cindy Martin, City of Boca Raton, FL; and Dr. Ricks Pluenneke, The Plant Pro, Ft. Worth, TX.

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Palmer is a leafy, turf-type ryegrass of medium maturity. It is capable of producing a persistent, dense, attractive, medium low growing, fine textured turf with a bright, dark green color. Palmer has shown good resistance to many races of crown crust, very good resistance to Rhizoctonia brown patch, and moderately good resistance to winter brown blight. This variety has shown modrate resistance to some species of sod webworm and has shown qood winter hardiness. Palmer has exhibited improved mowing qualities, heat tolerance, and summer performance characteristics. The variety has excellent seedling vigor and good wear tolerance. Palmer originated from germplasm collected from old turfs in Maryland, New Jersey, New York, Pennsylvania and Greece.

Pennant is an early maturing variety currently being produced by E. F. Burlingham and Sons, Forest Grove, OR. This variety has relatively good mowing qualities and an attractive bright, moderately dark green color. It produces a medium-fine textured turf with medium-high density and a reduced rate of vertical leaf growth. Pennant has good heat and shade tolerance and moderately good cold hardiness. It appears to require somewhat less nitrogen fertilizer for good performance than most other ryegrass varieties. Pennant has good resistance to Rhizoctonia brown patch, and moderately good resistance to winter brown bright, dollar spot and some races of crown rust. This variety also has good resistance to billbug and some species of webworm. Pennant was selected from an old lawn in College Park, MD.

Pennfine is an early maturing variety developed by the Pennsylvania Agricultural Experiment Station. It has been a very popular variety and since its release in 1972 has been the most widely used cultivar. It is a moderately low-growing turf-type variety with a moderately dark green color, medium fine texture and a medium density. The variety has moderately good resistance to Rhizoctonia brown patch, Typhula blight and some races of dollar spot. It is susceptible to the winter brown blight disease. Pennfine has shown good heat tolerance and medium cold hardiness. It has relatively good mowing qualities except during late spring when the turf becomes stemmy.

Prelude is an early maturing, leafy, turf-type ryegrass capable of producing an attractive, persistent, low growing, fine textured turf of medium high density and a bright dark green color. It has shown very good resistance to Rhizoctonia brown patch and many races of crown rust, good resistance to winter brown blight, and moderate resistance to red thread and pink patch. It has shown good winter hardiness and improved summer performance. Mowing qualities of Prelude are better than most varieties currently available. It has good tolerance to close mowing, shade and heat. Prelude has shown medium good resistance to some species of sod webworm in New Jersey.

Premier is an early maturing, persistent, low-growing, turf-type ryegrass with an attractive bright dark green color, medium fine texture, and improved mowing qualities. It has the excellent seedling vigor, wear tolerance, and wide range of soil adaptation characteristic of the best turf-type perennial ryegrasses. This variety has good cold hardiness and improved heat tolerance. It has shown good resistance to the Rhizoctonia brown patch disease and improved resistance to winter brown blight, dollar spot, and crown rust.

Regal is an early maturing ryegrass developed by International Seeds Inc. of Halsey, OR. Regal is a turf-type variety with a dark green color, medium fine texture and medium density. It has medium cold hardiness and good heat tolerance. Regal has shown good resistance to dollar spot, Rhizoctonia brown patch and billbugs. It is susceptible to brown blight and crown rust. Regal mows well except during its stemmy reproductive period in late spring.

Repell is a leafy, turf-type perennial ryegrass capable of producing a persistent, dense, attractive, low-growing turf of a bright, dark green color. This cultivar has shown good resistance to large brown patch disease incited by *Rhizoctonia solani* Kuhn, winter leaf spot disease caused by *Drechslera* spp., and many races of crown rust. Repell shows promise of excellent performance in both full sun and in light to

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Golf green reconstruction project, Santa Teresa Golf Club, San Jose, California, Jim Ross, Superintendent.

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moderate shade. Repell is also useful for the winter overseeding of dormant warm season turfs. Seed of Repell containing high levels of viable endophyte has demonstrated good resistance to damage caused by chewing insects such as sod webworm and billbug.

Tara is a leafy, turf-type perennial ryegrass of medium maturity marketed by Hubbard Seed and Supply, Hubbard, OR. It is capable of producing a persistent, moderately dense, very attractive, medium low-growing, fine-textured turf with a bright, medium dark green color. Tara has improved mowing qualities, good heat tolerance, and above average summer performance and winter hardiness ratings in New Jersey trials. It has shown good resistance to many races of crown rust incited by *Puccinia coronata* and good resistance to the large brown patch disease caused by *Rhizoctonia solani*. Tara has also shown good resistance to the winter netblotch disease caused by *Drechslera dictyoides*. Tara was the highest rated cultivar for 1983 in the national ryegrass tests seeded in 1982.

Yorktown II is a medium late variety developed by Lofts Seed Inc. of Bound Brook, NJ. It has an attractive, dark green color, a fine texture, high density and a leafy, low-growing, turf-type growth habit. It has shown good heat and cold tolerance. Yorktow- II has good resistance to brown patch and moderately good resistance to Fusarium patch and some races of crown rust. It mows well. □

exhibit enhanced turf performance.

A poor variety with endophyte is still a poor variety. However, a good cultivar containing endophyte may at times be superior to an equally good cultivar that does not contain endophyte.

In the next 20 years, turf breeders hope to develop ryegrasses that creep, grow lower and slower, resist insect damage, and tolerate herbicides better.

The "Endophyte Enhanced Performance" program has been proposed by Dr. Rich Hurley of Lofts Seed and Dr. Reed Funk of Rutgers. The intent of this program is to make clear to consumers the benefits of endophyte containing seed. This program is available to all companies wishing to participate. A special tag will be attached to seed bags of all cultivars of participating companies containing at least 80 percent live endophyte at harvest. This special tag would explain what the endophyte is and what benefits the consumer might expect if the seed is used properly. It is not yet clear how extensively this proposed program will be used.

Future

The past 20 years have been very exciting and productive for turf breeders working with ryegrass. The improvements in all aspects of ryegrass turf utilization have been great. Fortunately, ryegrass is a very genetically diverse species and continued improvement, though at a slower rate, can be expected.

Some of the more promising areas of potential improvements are insect and disease resistance, increased tolerance to herbicides, the development of lower and slower growing types, and the development of creeping varieties.

Ryegrass breeders have successfully met the challenges of the last 20 years and there is every indication they will be equally successful in the future. **WT&T**

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THERE'S NO GRASS GROWING UNDER THEIR FEET.
They apologize for not always being in when you call, but great stories are found in the field, not in the office. These pros know the only way to really cover the green industry is to get out and be a part of it. From turf test plots in Oregon to the corridors of our Nation's Capital, they're following leads, surveying markets and interviewing the landscape professionals who make our industry hum. Then, they use their years of experience to pull it all together, analyze it and present it to you in a crisp, easy-to-read and easy-to-use style. That way, you have the information you need to do your job better, faster and more effectively.

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A GREAT MEDIUM TO GROW PROFITS IN.

That silver lining

Optimism seems to be going the way of carrier pigeons and buggy whips.

For the past few years, the economy has had most industries in an ever-tightening half nelson; the future cast in different shades of gloom and doom.

In March, we began research on a story on water use, conservation, quality and quantity in the Green Industry. You will find the first part of it in this issue.

"Oh, no. More bad news," some of you may be thinking. On the contrary. Optimism has again found a niche.

In fact, after three months of traveling, doing over 50 interviews from California to Florida and more than 10,000 air miles, we found the most prevalent aspect was not that we are going to dry up and blow away, but that farsightedness may be the life preserver of an industry that could have been awash in apathy.

Right now, there is no immediate water shortage in this country. It's what could happen down the road, though, that golf course superintendents, landscape and golf course architects, other landscaping professionals and industry associations are trying to nip in the bud *now* before an industry-wide disaster hits.

The USGA Green Section is at the forefront contributing $5 million in funds in the next 10 to 15 years for research on various levels dealing with water problems. Industry professionals on an individual basis, are making contributions, that, when added together, can produce a groundswell of progress.

The awareness of the problem is there and it is building momentum.

For once an industry is *acting* instead of *reacting* to a potentially serious problem.

One final note. I had the privilege of interviewing Dr. Victor Youngner of the University of California, Riverside, for this story. On April 18, a day before his 62nd birthday, he died. His comments and observations from our interview have remained in the story. We feel Dr. Youngner's valuable contributions over the years to the turfgrass industry, and specifically his research in low-water-use turfgrasses, are the best tribute to a scientist who gave so much to his profession.

Maureen Hrehocik

Maureen Hrehocik, managing editor

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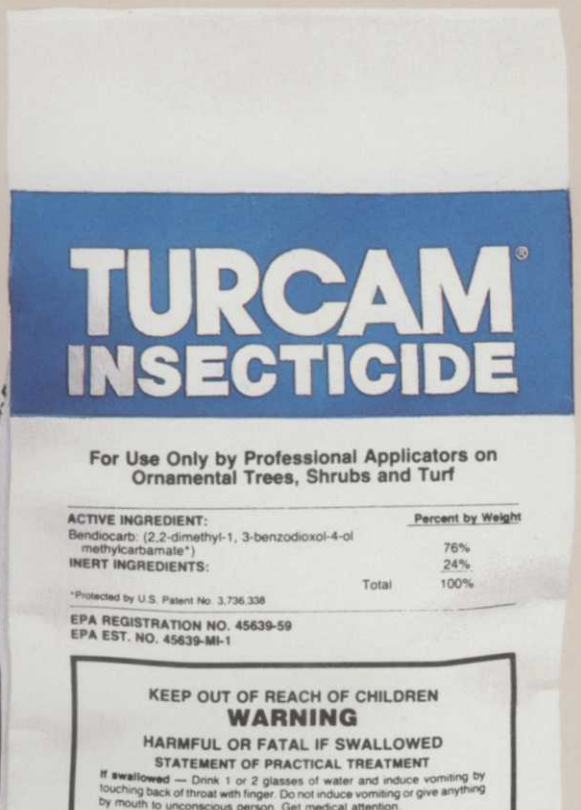

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Olympic	6.3	7.3	—	5.0	8.1	6.5	6.3	4.2	5.8	6.6	6.4	6.3
Clemfine	—	7.2	—	—	7.3	6.3	5.9	4.1	6.3	4.6	5.9	6.0
Galway	—	7.0	—	5.1	7.5	6.0	6.4	4.8	6.1	5.1	5.5	5.9
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